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The Proper Use of Tools

Probably almost as many tools are rendered unfit for service by careless or unintelligent use as by wear. Although such a high proportion may be surprising at first thought, a careful investigation of the tools sent in for repair or scrapping and an examination of the manner in which they are used will be illuminating. Some of the manufacturers of tools have found conditions such as to warrant them in sending men from gang to gang on certain roads, demonstrating the proper way to use their tools. If a manufacturer can afford to do this to build up a reputation for service for his products, a road is all the more warranted in taking similar measures to reduce its outlay for this equipment. Adequate instructions should remove the damage resulting from ignorant use of tools. That resulting from careless use can be partially corrected by directing attention to the losses which are caused in this way. Beyond this, discipline may be necessary in aggravated cases. The first step is to make sure that the supervisors themselves are thoroughly awake to the situation. They can then bring it to the attention of their foremen and drive home the idea.

The Value of Adaptability

The present is a time of rapid changes in every industry. Railway men are confronted repeatedly with the fact that old methods are no longer effective. The work is more pressing than ever before and its very urgency makes it necessary to get it done the best way possible, but at all events to *get it done.* The scarcity of materials introduces many obstacles; ties are hard to get and frequently of an inferior quality; old spikes must be reused; rail must be carried over; certain bridge timbers are no longer available; only the poorer grades of fuel are to be had for water stations. Moreover, labor is scarcer and less reliable than in past seasons. All of these handicaps are admitted, yet the work must be done. The situation demands the best from every man on the railroads to-day. One of the most valuable assets is resourcefulness. The soldier confronting the enemy who finds that he has exhausted his supply of ammunition does not stand aside until more is brought to him, but he uses his bayonet. So the railroad man must adapt his methods to conditions to-day and do the task assigned to him.

How About the Other Foremen?

In these days of inadequate labor supply the efforts of every man must be made to count, which harks back to the old question of the extent to which a foreman should work with his men. This has been discussed in sufficient detail in these columns and elsewhere with respect to the track foreman and the governing principles have been so clearly expressed that further discussion as regards that particular class of foreman is superfluous. However, this subject has had less of an airing as applied to the small gang foreman in other than track work. Maintenance work on bridges, buildings and water supplies, particularly the last two, frequently occupies the time of relatively small crews, and it is a common sight to see one of these gangs at work painting a bridge, laying a line of pipe or repairing a station platform, while the foreman idles about, talking with passers-by or, if working with his men, doing so in such a perfunctory manner that he accomplishes little at best while setting a most unbecoming example to his men. Certainly a foreman should not be-

come so engrossed in the amount of work he is accomplishing personally that he fails to see the shortcomings of the work done by those under his direction, but with the small gang the foreman should be able to do much himself without falling into this error. Moreover, most of the work, involving the employment of more or less skilled labor, affords little occasion for the giving of detailed instructions. Unlike track work, much of the work done by the miscellaneous gangs is conducted at some distance from the track, so that the foreman is not commissioned with the responsibility of protecting his men against passing trains. He must, of course, be on the lookout for unsafe conditions from other sources, but as a rule this does not entail a high degree of vigilance, and this responsibility, together with his other duties as foreman, should not prevent him from doing a considerable amount of effective work himself and with a spirit and vim that will be sure to set an excellent example to all of the men in his gang.

CHANGING CONDITIONS IN THE MATERIAL MARKET

WITH EVERY ADDED MONTH of our participation in the world's war giving a more intensive appreciation of the necessity for utilizing our entire resources to the very best advantage, there has been an ever-increasing effort to centralize the distribution of the available materials. The steel industry, which developed a most extraordinary condition of over-demand long before our entrance into the conflict, was the first to require attention. Buyers clamoring for a full share of a material, the supply of which was obviously insufficient, bid against each other, until the prices had attained heights beyond all reason. Then the government came into the market with its first orders for war materials, with the inevitable result that the principle of price establishment was adopted; applying it first to those commodities most in demand and later gradually extending the principle to all raw or semi-finished materials. Rules were promulgated establishing the priority rights of the several classes of preferred consumers, leaving the manufacturer free to dispose of any portion of his product which remained unassigned after these prior rights had been satisfied. Now as a final measure the War Industries Board has assumed entire control of the distribution of this material, so that no one can secure even the smallest quantity without showing a proper degree of necessity for the particular use which he desires to make of it.

In the case of lumber the situation has been somewhat different. Until this country undertook the mammoth shipbuilding program and the mushroom-like construction of the cantonments, lumber was plentiful and relatively cheap, but the demand has since become so great that regulatory measures have also become necessary as regards this material. The first regulations concerned the prices to be paid by the government for the lumber used in its various activities as well as restrictions on the use of the large-sized timbers so necessary in ship construction. Following the assumption of the control and operation of the railroads by the Government, its prices have been made effective as regards purchases for the use of the roads, while still greater restrictions have been added by the centralizing of the purchase of this material for the carriers. The latest activity along this line has been the fixing of prices and control of distribution for Portland cement.

All of these changes are war measures and must be considered only as such. They call for strict observance so long as they remain in effect and the sooner that everyone concerned adjusts himself to the new conditions the better. From the standpoint of the user who has certain priority rights as is the case with the railroads many advantages will accrue from this system, under the stress of the present conditions. It must also be borne in mind that this is but a temporary state of affairs and that the perpetuation of normal business will require that competitive conditions be returned as soon as the war is over.

CLEANING SURFACES FOR PAINTING

NO WORK DONE by painters in the maintenance of way department is more disagreeable and generally unsatisfactory than the cleaning of structural steel surfaces preparatory to repainting. When this work is done in other than a perfunctory manner, or, in other words, if some attempt is made really to clean off the rust and dirt, the work is hard. Moreover, the workman cannot see that he is accomplishing anything, and no matter how hard he works, the job is never really finished, for it could always be done just a little better. The foreman, on the other hand, is bound by the necessity of having the surface cleaned in some measure, and at the same time avoiding a degree of refinement that will involve the expenditure of more time and money than it is advisable to devote to this work. The only substitute for this method which has been devised up to the present time is the sand blast, a most effective device which has been applied extensively in many manufacturing processes, but which for various reasons has been used only to a limited extent on bridge work. Without attempting to analyze the reason for this other than to voice a single objection sometimes suggested to the effect that the work is done more thoroughly than the present standards of maintenance seem to justify, the question is raised as to the possibility for the development of a cleaning tool operated by air or electrically (where applicable) and designed along the line of the floor and cement surface finishers. This suggestion is open to one objection raised against the sand blast, the need of an air compressor plant on the job. But with the increased use of power tools, the presence of a power plant of any kind on even a small job will eventually become more and more common. No matter how this problem is solved, whether by the sand blast or some other device, the need of mechanical equipment to eliminate this disagreeable and arduous manual labor is becoming increasingly apparent.

THE RAIL SHORTAGE INCREASES

IT IS UNIVERSALLY RECOGNIZED at the present time that all other interests are secondary to that of winning the war. For this reason if it is necessary to convert the steel normally turned into rails into shells and ship plates no one should object as long as this does not cripple our railways to the point where their ability to move the traffic thrust upon them is endangered. On some roads the standards of maintenance have been so high that they can pass safely through a season with little or no rail. On others, the normal allotment can be reduced considerably, while on others a full season's tonnage is necessary if the property is to be in condition to haul traffic safely and expeditiously. The roads and the public can afford to put up with poorer riding rail for a time if safety is not endangered and if this sacrifice is necessary.

From 1906 to 1916, inclusive, an average of 2,986,339 tons of rails was rolled, almost all of which was for

domestic use. In 1917, 2,944,161 tons were rolled. Superficially these figures indicate only a slight shrinkage in the quantity of rails used. However, in 1917 an unusually large tonnage went overseas for the use of our allies and of our troops in France. While the figures for domestic consumption are not yet available, probably less than 2,000,000 tons were used by the railroads of the United States. This year the production is being reduced still further. Although over 2,000,000 tons of rails were on order this spring, the mills are rolling less than 25,000 tons per week, a rate at which they will turn out only about a third of a normal season's output. The season is now so far advanced and the demand for steel for immediate war needs is so great that no material change in the present situation can be expected this year. It is therefore a foregone conclusion that another 2,000,000 tons will be added to the already large accumulation of deferred rail renewals.

In considering the operating results of the roads this year, it should be borne in mind that the net income account will be excessive by the extent to which deferred maintenance is piled up. In the meantime it is up to the maintenance of way forces to do the best they can with the materials at hand, conserving them as much as possible in order that the roads many be able to respond to the demands made on them.

SOME REFLECTIONS ON THE LABOR PROBLEM

THE LABOR SITUATION continues to exercise a controlling influence on the season's maintenance of way work. It is now the first of July and almost half the working season has passed, yet only limited progress has been made in the heavier renewal work on most roads—much less than in normal years. The most disquieting feature of the present situation is the fact that the three months which have passed are the best months in the year for maintenance work and we are now entering the period when the output of work is reduced, even in normal years. The hot weather of July and August is not conducive to high efficiency, while the migration of men into the harvest fields will undoubtedly be heavier than usual this season owing to the urgent demand for help to harvest the large crops. By the time the men return from the harvest fields it will be necessary to close up work for the winter. A further influence this year is the heavy call for labor from the munition plants and ship yards, which are offering high wages. The condition which is confronting the roads at the present time is therefore far from satisfactory. The western regional director has endeavored to solve the problem by eliminating the competition for men between roads. To this end maximum rates of wages have been fixed, standard hours and working conditions have been specified and agencies for the hiring of men have been brought under the common direction of the United States Department of Labor on all roads west of Chicago. While these measures have placed all the western roads on a common basis they have not eliminated competition with other industries and with other government activities. As a result the benefits secured from these measures, which are at present confined to the western roads, are of limited value.

Reports emanating from Washington during the last few days indicate that the United States Department of Labor is planning to meet this competition for men, which is common in practically all activities, by taking over the recruiting of common labor for all industries. By establishing a monopolistic control of the hiring of men it will be possible to arrest the competition which now exists and to send the men to those industries where they are most needed from the standpoint of the public welfare.

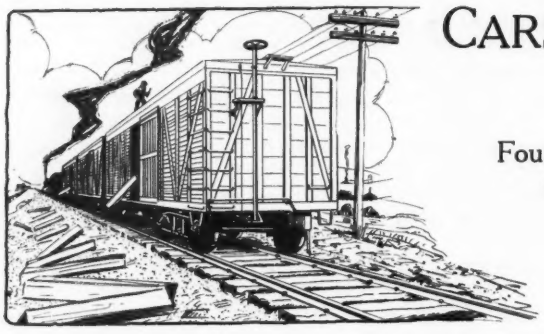
Many men believe that the supply of labor in this country is sufficient for present demands if some method can be developed to eliminate the loss which now results from frequent changing of position. A thorough test of this plan alone will show the correctness of this statement, although there is no question but that the shortage can be very greatly relieved by this drastic action.

It is doubtful if this measure can be made effective in time to be of much assistance to the roads this season, and such relief as is possible lies largely in the hands of the local railway officers. With the inauguration of the "work or fight" order on July 1, and the designation of certain industries as non-essential, a considerable number of men in every community must enter new work. An alert foreman or supervisor can add to his forces by being on the lookout for such men. A considerable number can also be recruited from the schools if proper effort is made to call this work to the attention of the students. The Chicago, Burlington & Quincy has secured 50 men from the University of Chicago, who will spend the summer on track work near Sheridan, Wyo. This road has also taken on about 300 high school boys at different points along its line. Labor secured in this way is a net gain as far as the roads are concerned, for it would otherwise be lost to them.

Present conditions are also adding to the demand for the raising of some of the restrictions against foreign labor. With the demand for men as great as it is now and with work essential to our welfare, delayed because of a shortage of labor, it has not seemed consistent—to say the least—to hold up the bars against the entrance of Mexicans as has been done so far this season. The roads in the southwest have depended upon this country for their track labor for years and have found these men satisfactory. Arrangements have been made to bring in a considerable number for limited periods to work on farms in the southwest, and it is gratifying to learn that similar measures have been taken with reference to labor for employment on railways and in mines within the last few days.

In Canada, where the conditions have been equally or more acute, efforts are now being made to permit the importation of Chinese. Large numbers of coolies have been transported across Canada for work behind the lines in France and more can be secured for employment in Canada. A considerable number of Chinese are now engaged in track work in Western Canada, where they have given excellent satisfaction, and some are working as far east as Winnipeg. Because of the deep-seated prejudice against the admission of oriental labor in this country, and particularly on the Pacific coast, it is very doubtful if the people of this country will consider the lowering of the bars in this direction even temporarily. At the same time, this offers one solution of our labor shortage.

The labor problem requires the closest attention at the present time. Upon its successful solution depends our progress. This is no time for the development of fads and fancies, neither should prejudice blind us to our necessities. The conditions demand action. The roads and their local officers can do much to help themselves by recruiting into their service all the labor that can be secured locally. Beyond this, it is necessary for the government to come to their aid by removing adverse competitive conditions now handicapping them, and by opening sources of labor now closed.



CARS CAN BE SAVED BY CAREFUL PLANNING

Four Men Describe Methods by Which the Maintenance of Way Department May Reduce the Demand for Equipment

WITH THE DEMAND for cars now exceeding the number available and with the indications that this condition will continue indefinitely, it is the duty of railway men to reduce the number of cars required for the handling of company material to the minimum in order that the roads may be able to handle the commercial business of the country as promptly as possible.

Four discussions of practical methods by which the maintenance of way department can co-operate in reducing the drain on equipment were published in the June issue. Four other discussions of this same subject received in the contest on the Conservation of Equipment by the Maintenance of Way Department are published below.

THE FOUR ESSENTIALS OF CAR CONSERVATION

By W. G. Dungan

Assistant Superintendent, Chicago, Burlington & Quincy, Deadwood, S. D.

There are four important ways by which cars may be saved in handling company freight: (1) By utilizing light traffic periods and seasonal movements of empty equipment. (2) By providing a return load for the empty car. (3) By loading cars to capacity. (4) By prompt unloading of company freight, both carload and less than carload.

The first is largely an operating problem. It should be obvious to everyone that the movement of company freight should be restricted during the period of heavy traffic, when power is overtaxed and terminals congested. A load of company ties in a coal car moving in a trainload of coal in December would represent the zero of power and car conservation. The maintenance of way department should arrange work so there will be no necessity for carload shipments at such periods. There are regular seasonal movements of empty equipment that can be utilized for handling company freight.

There are the empty stock cars outbound from the packing center, the empty coal cars returning to the mines, the midsummer movement of empty box cars to the grain belt and many others, all of which can be used in the hauling of company freight. Flat cars, which are always in demand for maintenance of way work, move outbound from industrial centers early in the spring with farm machinery. The empty return movement affords an opportunity for distributing ties piled at way stations and for moving the winter's accumulation of scrap. The late summer movement of flats with threshing machinery comes at an opportune time for loading back rail released during the spring and summer months, and old ties going to engine terminals for kindling and for general scrap loading. Maintenance work should be planned to take advantage of the empty car movements.

A comprehensive plan for the transportation and distribution of track ties affords a wide field for car conservation. Ties should be furnished in units of work train days. If, on account of traffic or a limited available force of men, the distribution of 10 cars of ties is a day's work on any particular district, ties should be sent to that district in 10-car lots. On other districts 40 cars might represent a day's work.

Stringent orders against overtime in maintenance work are not conducive to car conservation. An hour's overtime with a work train and gang may finish the job, save a work train day and return 20 cars to commercial service to-day instead of to-morrow. There will also be straggling cars delayed on account of bad order, errors in billing, no bill or various other causes that delay cars. These cars should be unloaded and the ties piled at stations and distributed later by local train when a flat car is available.

The cost of unloading, reloading and distributing a single carload of ties on a flat car will not exceed the cost of distributing from the original stock, box or gondola car. This is due to the longer time required to unload and to the construction pay of the train and engine crews. The largest single item of cost in unloading a few cars of ties by local train is the pay of the train and engine men. Drop bottom coal cars may be used to advantage in handling ballast for small jobs. They may also be used for handling cinders.

Material should be furnished systematically during the progress of the work. In rail relaying it is often possible to use the cars on which the new rail is received for a return load of rail released. The same is true for material for bridge repairs. If furnished during the progress of the work, the same gang that unloads the car can reload the same car with second-hand material released from the last bridge repaired. A peddler car of repair material for switches and frogs may be loaded back with scrap. These are a few of the ways in which the maintenance of way department can furnish a return load for their own empties.

Loading cars to capacity is principally a store department problem. It has been worked out successfully on the C. B. & Q. in loading repair material in station order. This method was first used in shipping switch ties from the tie-treating plant at Galesburg. The complete bill of switch ties for each station is loaded together, with several shipments in the same car, and each shipment marked. These cars break bulk and run out the same as merchandise peddler cars, each car covering a definite part of the line.

The maintenance department's part in this program is to unload the material at each station without setting the car out. This requires advance information from the despatcher as to the arrival of the car. The roadmaster will then have his men on hand at each station to unload the company material while the local crew is doing its regular station work.

A comprehensive plan for gathering small scrap can

be worked out to fill cars. Instead of starting several scrap cars at the same time on different roadmasters' districts and on different branch lines, one car should cover enough territory to fill it and another car then started where the first car left off. Use local merchandise cars for less-carload company freight. A single frog can be loaded in a merchandise car and probably save a car and also help out the tonnage of the merchandise car.

The prompt unloading of company freight requires close co-operation between the transportation and maintenance departments, between the chief despatcher and the roadmaster, between the agent and the section foreman. Advance information about the probable time of arrival of a car of company material will do more towards releasing cars promptly than a thousand "why did you not's" after it has been delayed.

When a car of company material shows on a consist or destination report, the head of the department should be advised by wire. He may want to divert it to a point where a gang is working so that the car can be unloaded promptly. The advance information will at least enable him to unload the car more economically and in many cases save a car day. This information is very important for the bridge and building department, where one gang covers a considerable mileage. The gang may be a hundred miles away on a branch line with tri-weekly service and the train gone.

Co-operation between the different branches of the maintenance of way department will release cars. A signal gang *could* unload bridge material (does it ever do it?). The new trainmaster insulted the car man when he asked him to carry a bucket of water; his job was to carry wood. In these times we must all carry wood *and* water.

To the agent and all foremen (section, B. & B. signal, telegraph, etc.), if it is company material and billed to the station where your gang is to-day, unload it to-day regardless of the department you are working for or the department to which the material is billed. If there is any question about where it should be unloaded, wire headquarters. If you get no information to-day unload it to-morrow, even at the risk of reloading. It may wake up headquarters.

UTILIZING CARS THE ENTIRE YEAR

By J. J. Hess

Assistant Engineer Maintenance of Way, Great Northern, Spokane, Wash.

All cars are utilized the entire year. Work train equipment, such as cars used for hauling ballast, bank-widening and other maintenance work, are transferred immediately and put into commercial use as soon as we are through with them in maintenance work. We have no equipment in use in the roadway department that is not transferable and is not put in commercial use as soon as maintenance work is finished.

Better results would frequently be obtained and delays eliminated if, instead of company material being consigned to some division officer by name, it was consigned to the section foreman, for instance, for he would then know it was for him and would unload it immediately.

We pay close attention to the loading of cars to capacity. We also strive to ship material in such a way as to avoid having a surplus of cars in any service. For instance, this road is now engaged in building a stretch of double track. The rail is loaded and moved in sufficient quantity so as to be disposed of daily and cars are forwarded with little or no delay to points where ties are loaded and returned. By so doing the cars answer a double purpose. Everyone is on the alert and wide awake as to the necessity of equipment conservation. To impress the subject more forcefully on our officers, an order was recently issued by our management that, since shippers were being penalized for failure to release cars in the specified time, heads of departments would likewise be held to strict account for any and all unnecessary delays.

SIMPLE HINTS FOR CAR CONSERVATION

By C. H. Carpenter

There has always been a tendency in the maintenance of way department to pay very little attention to conservation in the use of cars. This has been brought about by the comparative plentifulness of cars up to a short time ago and to the fact that many roads have allotted a good many cars, perhaps too many, for special maintenance of way work. To the average maintenance man it mattered little whether cars were loaded or moved promptly or whether they were loaded anywhere near the maximum capacity. The cars were assigned to the maintenance of way service and were used for nothing else. Whether or not too many cars had been assigned was little thought of. This brought on the incentive to ignore delays to foreign line cars and home cars that were not assigned.

Perhaps the greatest opportunity in the line of conservation for the maintenance of way department is to speed up the unloading of cars. In this way many days' delay can be avoided. Too often cars are used for storage instead of for vehicles of transportation. This is what we have been battling so hard with the public for for some time and we surely should not be guilty of the crime with which we charge the public. Quite often cars loaded with track material are billed to small outlying stations where the section foreman is not notified promptly and the cars lie untouched for some time. The freight agent does not push the matter of unloading because he knows there will be no demurrage charges and he assumes that the maintenance of way department will unload the car when it is ready for it. Then after the car has stood for five or six days someone notices it and the car is then unloaded.

There should be a remedy for such cases as the above. An open file should be kept for each car that is billed out from the maintenance of way office until the car is released and this file should be followed up to see that there is no unnecessary delay. All section foremen, bridge carpenters and others who handle carloads should be impressed with the importance of the prompt handling and unloading of cars.

A second need in the conservation of cars is an increased load. Too often cars are loaded and forwarded under one frog or one or two pieces of timber for some particular job when these things could be shipped just as well and as quickly in regular way merchandise cars. Often such shipments are loaded on flat cars or in box cars because they can be loaded direct from the point of storage and avoid perhaps two or three hundred yards of trucking. This practice should be avoided. On the average railroad many days of per diem could be saved by a close watch on this one item. It again corresponds with the recent agitation among shippers to increase the load per car. And, again—we cannot throw stones if we live in a glass house.

Another saving in cars can be obtained through good planning of work train service. All work should be laid out beforehand and the number of cars needed decided upon so that there will not be an excessive number of

cars held out for work trains. Then all cars should be unloaded the same day they are loaded when practicable and the empty cars left where needed for other purposes or left where they can be moved promptly.

Sometimes too many cars are assigned to special service and stenciled not to be used in any other service, resulting in excessive delays. When cars are to be assigned to special service, especially if serviceable cars are to be used, the matter should be well gone over to see that the fewest cars consistent be used. Then the maximum service should be gotten out of these cars.

Quite often perfectly good flat cars are used for building scaffolds for overhead work or for supporting concrete mixers and perhaps used for a few weeks and then left idle for months, because the particular scaffold or mixer is not needed. It would be only a matter of a few dollars' expense to remove the scaffold or mixer to the ground and release the car, while many dollars in per diem are lost in the neglect to do this. No good car should be delayed in this way over two weeks.

To put the conservation of equipment by the maintenance of way department into the fewest works possible:

All cars should be loaded in the shortest possible time.

The light load should be avoided.

All cars should be unloaded promptly on arrival at destination, avoiding every moment of unnecessary delay.

An accurate check should be kept on all loads to see there is no slipup in prompt handling.

All work in which cars are required should be planned and studied before handling, to avoid the over-assignment of cars.

Too many cars should not be assigned to any service.

"Service" cars should not lie idle just because they are "service" cars.

Don't let the "scaffold" car get ancient.

SAVING CARS IN ROUTINE WORK

By J. T. SHEAHAN

Engineer Maintenance of Way, Wabash, Moberly, Mo.

We have an order that scrap of all kinds shall be loaded and shipped to the division storekeeper on the twentieth of each month. It is to be separated, with the rail on a car by itself, and with angle bars and short scrap in one end of a car, while car and engine scrap is loaded in the other end. We have followed this out to the letter as far as we can. A very good way is to have the supervisor go over his territory a few days prior to starting the cars in the local freight and have all scrap cleaned up and put in a scrap box at the station or where it will be handy to load in cars when the train arrives on the morning of the twentieth. Bolts, spikes and small scrap are loaded in kegs or boxes as far as practicable so as not to delay the loading of the scrap. The supervisor and two sectionmen accompany the local and the scrap is loaded while the train crew is doing the station work. If we have sufficient scrap to load the cars to their capacity, we do this to avoid calling for other cars. This plan has brought very good results.

Another problem which causes a great deal of work during the winter is the care of cinders made at large engine terminals. These cinders should be loaded in side dump cars or hopper bottom cars. A cinder track should be provided along some track outside the yard on which cinders can be run out and dumped and the cars put back in the pit the same day. This work can be performed by a switching crew in the yard. It is not practicable to set cinders out in any kind of a car in cold weather, as they freeze in the car. We avoid this by unloading them promptly at the division point from the cinder track. In the spring, when there is not usually such a demand for coal cars, cinders are loaded in hopper bottom cars, run out on different parts of the line where they are unloaded by a local train with a ditcher and a clam shell bucket. The supervisor has his men meet this train on a certain day and distributes the cinders where needed on the line.

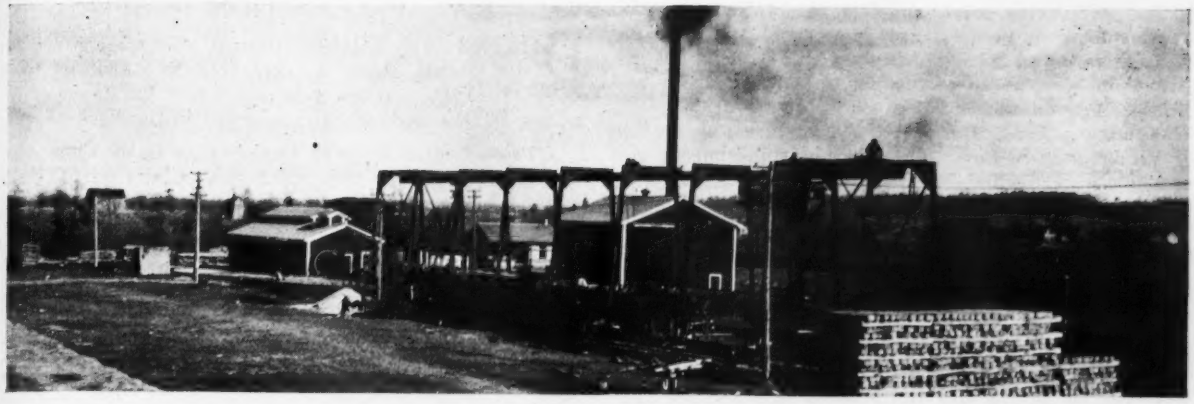
Another great saving in the use of cars can be effected by their loading by the division storekeeper. We have an understanding that when necessary to load material for a given direction he will load different orders for other materials, such as crossing plank, cattle guards, plank for platform repairs, and bridge timber on a car in station order. The material that is to be unloaded first is loaded last. The supervisor is then notified and the section men meet the local and unload the supplies destined for their station. In many cases we find it better to send a few men along with the local and unload the material at the stations and bridges where it is to be used. Where larger pieces of material are for a bridge at a distance from a station, the supervisor sees to it that the train crew has an order to stop at this particular bridge to allow the men to roll off the material. In this way we unload from one car material for six different jobs, using the section men principally, not only to unload their own material but also that for the bridge and building department when it is in less than carload lots.

The same method is used in handling ties manufactured along our territory. The ties are loaded at stations in cars routed "home." The cars are billed in station order, and the section men unload the ties at the stations during the early spring months. Later flat cars are furnished the section gangs to reload the ties and distribute where they are to be used along the track. This is done in order not to delay the local trains by unloading them out of stock cars with small forces. No. 1 and No. 2 ties are usually loaded in tie yards. When unloaded at their destination, the section foremen pile the No. 2 ties separate and only distribute the No. 1 ties for the main line, leaving the others in the yard for side and passing tracks.

We find a very good scheme in operating a ditcher is to have two 20-yd. air dump cars, one at each end of the car carrying the ditcher. Material is loaded in these cars by the machine and dumped, using a spreader to level down the dirt. This is a great saving over the old way of putting it on flat cars and plowing or shoveling it off.

A great saving can be effected in the use of equipment of all kinds loaded by maintenance of way forces by seeing that all cars, whether carrying ice, rail or ties, are loaded to as nearly their full capacity as can be judged by the supervisor, and to get everybody concerned in touch with the movement of material. We have to have help from all concerned, from the superintendent down to the section men. If everybody takes the proper interest, there will be very little delay to equipment and a large amount of the work train service can be eliminated.

LABOR TURNOVER—To gain some idea of the rate of the present labor "turnover" on the Pennsylvania Railroad, and particularly the extent to which men are being replaced by women, a special record was kept for the 10-day period from May 27 to June 5 inclusive, on all divisions of the Lines East, and an analysis of the figures has been made. In the period named, 4,477 employees left the service and 5,122 new ones were hired. The net gain of 645 occurred entirely in the last two days of the period and was apparently sporadic.



General View of the Plant

AN INTERESTING TIMBER PRESERVING PLANT

Introduction of Mechanical Handling Equipment Effects Reduction in Labor Costs and Saves Time

TONGS USED in connection with a mono-rail crane for handling treated material, a fireless steam locomotive and standard-gage car trams with a standard-gage track in the treating cylinder are special features of the plant of the Michigan Wood Preserving Company at Reed City, Mich. Through the use of these, material savings of labor have been accomplished and certain complications of plant operation have been materially reduced.

The method of loading treated timbers from the trams onto cars is of particular interest and the accompanying photographs show clearly the principal features and mode of operation. The tongs are suspended from a mono-rail, which also supports a cab containing the controller for the motors by which the tongs and crane are operated. One motor propels the crane along the mono-rail, one raises and lowers the crane and one opens and closes the jaws of the tongs. The crane has a rated capacity of 12,000 lb., but has been used to 50 per cent over-load in handling piles.

The mono-rail stands astride of a standard-gage track located convenient to the treating cylinder. In operation 10 trams loaded with treated ties or other materials are placed on this track under the mono-rail, to-

HANDLING PILES WITH THE MONO-RAIL CRANE

gether with some empty gondola cars. Four men do the loading, one in the cab of the crane, two removing bales from the trams and one in the gondola being loaded. The tongs pick up all of the ties on a tram readily and release them in the car. An entire string of 10 trams containing a total of 600 to 700 cars are unloaded in this manner in 30 min. The preliminary designs of this machine were worked out by Grant B. Shipley and J. M. Weber, and after submitting the design to several manufacturers a contract was given to Pawling & Harnischfeger, Milwaukee, Wis., to perfect and build the apparatus to suit the standard mono-rail crane motor equipment manufactured by that company. The equipment has been entirely satisfactory and is a great labor saver.

The first fireless locomotive was purchased from Orenstein-Arthur Koppel Company, of Berlin, in 1913, and has been so satisfactory and efficient that another locomotive of this kind, but larger, has been purchased since from the H. K. Porter Company of Pittsburgh. By using

TIES PICKED UP BY THE TONGS

these all fire is eliminated. There are no grate bars to look after, no water to watch; in fact, it eliminates entirely the danger of fire throughout a timber treated yard where large quantities of ties, lumber, etc., are stored. The locomotives are recharged on an average once every three hours to a steam pressure of 150 lb. per sq. in. in from 5 to 15 min. On level track these locomotives will pull as many as 10 standard-gage gondolas loaded to capacity. The locomotives are used for switching standard railway cars in and about the storage yard and in shifting trams to and from the treating cylinder. The use of standard-gage track throughout the plant has greatly simplified the track layout. The treating cylinder is 7 ft. 6 in. in diameter, which is ample for the use of standard-gage equipment inside.

Another feature of this plant is the use of compressed air, entirely, in the application of pressure in connection with the automatic weighing device, rather than the use of pressure pumps for the preservative. We are indebted for the above information to Grant B. Shipley, president of the Michigan Wood Preserving Company.

RAIL PRODUCTION IN 1917

DURING 1917, 2,944,161 tons of rails were rolled in the United States as compared to 2,854,518 tons rolled in 1916. While this represents an increase of nearly 90,000 tons, when considered in the light of the increase in rail exports, it represents a net decrease in rail consumption in this country. The details of rail production between 1902 and 1917, inclusive, are given in the accompanying table, which is taken from a special bulletin issued by the American Iron and Steel Institute. Another fact to be noted in this table is the proportionate increase in the rolling of Bessemer rails during the last year, 18.11 per cent being of this character, as compared to 15.42 per cent in 1916 and 14.83 per cent in the preceeding year.

PRODUCTION OF RAILS BY PROCESSES, IN GROSS TONS.

Years.	Open-hearth.	Bessemer.	Rerolled*.	Electric.	Iron.	Total.
1902	6,029	2,935,392	....	...	6,512	2,947,933
1903	45,054	2,946,756	....	....	667	2,992,477
1904	145,883	2,137,957	....	....	871	2,284,711
1905	183,264	3,192,347	....	....	318	3,375,929
1906	186,413	3,791,459	....	....	15	3,977,887
1907	252,704	3,380,025	....	....	925	3,633,654
1908	571,791	1,349,153	....	....	71	1,921,015
1909	1,256,674	1,767,171	....	†	...	3,023,845
1910	1,751,359	1,884,442	....	†	230	3,636,031
1911	1,676,923	1,053,420	91,751	462	234	2,822,790
1912	2,105,144	1,099 926	119,390	3,455	...	3,327,915
1913	2,527,710	817,591	155,043	2,436	...	3,502,780
1914	1,525,851	323,897	95,169	178	...	1,945,095
1915	1,775,168	326,952	102,083	....	...	2,204,203
1916	2,269,600	440,092	144,826	....	...	2,854,518
1917	2,292,197	533,325	118,639	....	...	2,944,161

*Rerolled from old steel rails. Included with Bessemer and open-hearth steel rails from 1901 to 1910 inclusive. †Small tonnages rolled in 1909 and 1910, but included with Bessemer and open-hearth rails for these years.

PRODUCTION OF RENEWED AND REROLLED RAILS, 1911-1917.

Years.	Rerolled from new seconds, new defective rails, etc.			Rolled from old rails.	Total rerolled.
	Open-hearth.	Bessemer.	Total.		
1911	2,631	19,379	22,010	91,751	113,761
1912	13,140	29,446	42,586	119,390	161,976
1913	13,052	30,741	43,793	155,043	198,836
1914	13,538	13,234	26,772	95,169	121,941
1915	6,477	2,652	9,129	102,083	111,212
1916	1,711	2,149	3,860	144,826	148,686
1917	1,825	7,182	9,007	118,639	127,646

PRODUCTION OF RAILS BY WEIGHT PER YARD, 1902-1917.

Years.	Under 45 pounds.	45 and less than 85.	85 and less than 100.	100 pounds and over.	Total, gross tons.
1902	261,887	2,040,884	645,162		2,947,933
1903	221,262	1,603,088	1,168,127		2,992,477
1904	291,883	1,320,677	672,151		2,284,711
1905	228,252	1,601,624	1,546,053		3,375,929
1906	284,612	1,749,650	1,943,625		3,977,887
1907	295,838	1,569,985	1,767,831		3,633,654
1908	183,869	687,632	1,049,514		1,921,015
1909	255,726	1,024,856	1,743,263		3,023,845
1910	260,709	1,275,339	2,099,983		3,636,031
1911	218,758	1,067,696	1,536,336		2,822,790
1912	248,672	1,118,592	1,960,651		3,327,915
1913	*270,405	†967,313	2,265,062		3,502,780
1914	*238,423	†309,865	868,104	528,703	1,945,095
1915	*254,101	†518,291	742,816	688,995	2,204,203
1916	*295,535	†566,791	1,225,341	766,851	2,854,518
1917	*308,258	†882,673	989,704	763,526	2,944,161

*Includes rails under 50 pounds. †Includes 50 pounds and less than 85 pounds.

Another table given herewith shows the production of renewed and rerolled rails for 1911 to 1917, inclusive, from which it is seen that in spite of the demand for rails there has been a further reduction in the tonnage of rerolled rails, the total being only 127,646 as compared to 148,686 in 1916 and the maximum tonnage of 198,836 tons in 1913.

The third table shows the production of rails from 1902 to 1917, inclusive, classified by weights per yard. The increase in tonnage rolled in weights from 45 to 85 lb. per yard may be explained by the orders placed by the United States Army for rails used in France, which were for 80-lb. A. R. A. rails. Some idea of the actual decrease in tonnage of rails used for renewal work on important main lines in this country is obtained from a study of the figures for rails rolled in weights of 85 lb. per yd. and upward, which aggregated 1,753,230 tons in 1917 as compared to 1,992,192 tons in 1916.

Motor Cars on the Lehigh Valley*

BY F. N. LOUGHNAN,
Division Engineer, Lehigh Valley, Wilkes-Barre, Pa.

THERE IS NO QUESTION but that the work of the trackman is the most perilous in the railroad service. He is continually working upon the track, where it is necessary for him to be stooped over, with his eyes on the work in which he is engaged, and with the noise of his tools, which prevents him from hearing the approach of trains, his attention is distracted from the danger of being run down.

A great deal depends upon the vigilance and watchfulness of the foreman in keeping his men from meeting with accidents under such conditions. On single lines this danger is not so great as on double-track or on four-track lines, where trackmen must watch out for trains running in opposite directions. It is an established rule on the Lehigh Valley that where two or more main tracks are in operation the trackmen must stand clear of all tracks while trains are passing. All track foremen are also supplied with whistles to signal their men to move on and off tracks to comply with this ruling.

A large number of our section and extra gangs are equipped with motor cars and only a small portion of them now have the lever or pump car. Every section foreman is regularly qualified in the operating rules of the road. Where motor cars are operated by other than track foremen, such operators are regularly examined in the operating rules and the cars are provided with the necessary signal protection for both day and night, which includes practically the same flagging paraphernalia provided for trainmen.

LESS ACCIDENTS WITH MOTOR CARS

Our experience with vehicles for the movement of maintenance of way forces is that the motor car is not a fruitful source of accidents. While we have had accidents due to defective wooden handles in the old lever cars, we also have had as many or more accidents with those cars due to other causes. However, the accidents with the old lever cars in recent years have been due to their being run into by trains following, or in other words, the lever cars were too slow to keep out of the way of following trains, where, if their speed could have been increased, the accidents would have been avoided. These accidents were caused by trains overtaking such cars on sharp curves where their view was obstructed.

We have had a few accidents with motor cars, but none was due to faulty equipment. We have had no accidents due to improper handling of the cars. The few mishaps we have had with motor cars can be said to be due to overloading. The motor car has developed into such a facility for conveying men to and from work, especially with track or bridge gangs, that the hand car has become obsolete. We do not have enough motor cars to equip every section and extra gang, consequently some motor cars are occasionally overloaded. With a sufficient number of motor cars to equip every section and extra gang properly, in both track and bridge forces, so that no car would be overcrowded, accidents of this character would be very few, compared with the old lever truck in similar service.

We are decidedly of the opinion that accidents due to motor cars are less, comparatively, than with lever cars. In the first place, there is no wooden lever to become broken, the motor car being self-propelling. Secondly, in recent years, with the heavy traffic in which a larger number of trains and engines are running over our railroads, the old lever car is too slow to move gangs of men over important main lines with the requisite speed to run between, and keep out of the way of trains. This is especially the case on mountainous divisions and heavy grades where the propelling of the old lever truck up grade is practically out of the question.

KEEP TOOLS FROM SLIDING OFF

It is the practice on the Lehigh Valley when new motor cars are received to construct a block on the floor of the car at the ends to prevent bars from sliding off, as there is more danger connected with this type of tools sliding out than any other carried on the cars. In many cases we make a practice of removing the handles from picks and they are loaded on the cars separately, being laid on the floor where there is no danger of their creeping out on account of the vibration of the car when running.

While speed is looked upon generally as being the menace of the motor car, to my knowledge we never have had an accident due to this cause. It is an imperative rule on the Lehigh Valley that motor cars should not be run in excess of 20 miles an hour. We consider this a safe rate of speed for motor cars, and, in fact, we have found from experience that a lower speed is too slow on the busy railroad of to-day. Our road is equipped for telephone dispatching, with telephone booths located at practically every foreman's headquarters. The foreman can get in touch with the dispatcher every morning for information about the trains.

We consider the education of our men on the subject of safety, especially in the operation of motor cars, as an important factor in the prevention of accidents. It is the practice whenever an accident of any character occurs to issue general instructions to all concerned,

*A discussion of a paper on the operation of motor cars by G. S. Watkins. Both the paper and this discussion were presented before the last annual meeting of the steam railroad section of the National Safety Congress at New York. Mr. Watkins' paper was abstracted in the November, 1917, issue, page 357.

giving the nature of the accident, and the measures which should be taken to prevent a recurrence. Names of those involved are, of course, omitted.

REGULATIONS

The following are a few of the more important regulations issued by the Lehigh Valley, governing the operation of motor cars, which are rigidly enforced:

When a new motor car is introduced on a section where the foreman is expected to operate it, an experienced motor car operator must be detailed to educate the foreman in its use and instruct him how to maintain it. He is not to leave until the foreman is properly qualified to handle the car.

All motor cars shall be equipped with signal protection for both day and night. At night they shall be equipped with two red lights on the rear end and two white lights on the head end. In addition they shall carry torpedoes night and day, and a red flag by day.

Motor cars, when in operation and running behind trains, should keep ten rail lengths, or over 300 ft., from the rear of the train.

When approaching a public or private crossing motor cars must run slow enough to come to a full stop before passing over the crossing.

Daily inspections shall be made by the man in charge of all the mechanism on the car, to see that it is in perfect running order.

The mechanism on the cars is to be cleaned by those in charge every day.

Periodical inspections of the cars are to be made by the regular motor car repairman at least once a month.

Periodical inspections are also to be made by the supervisor, division engineer and superintendent, as an incentive for the cars to be kept in proper condition and working order.

The substitution of the motor car for the slow propelling lever truck is a great step in the direction of safety on the busy railroads of to-day, and, in fact, the elimination of the old hand car is an absolute necessity to meet modern requirements. Again, the motor car increases efficiency, while it considerably decreases the expenses of our railroad operations. Since the introduction of motor cars on the Lehigh Valley we have found this facility of such value that the equipment has been used for almost everything.

The motor car has demonstrated itself to be a great facility in moving maintenance of way and other forces to and from their regular work, and has also proved invaluable in cases of emergency, such as washouts, derailments, etc. In the case of tracks made impassable by washouts or slides, where considerable track mileage is involved, a great deal can be accomplished with motor cars in making a reconnoissance of the affected territory. The main advantage gained in such cases is that the motor car can be run over the tracks washed out or carried around obstructions, such as slides, etc., where, under similar circumstances, if a locomotive were employed, it would be necessary to repair the tracks or remove the obstructions before the engine or its equipment could pass over them, which would necessarily delay the distribution of repair forces, and, as a consequence, retard the restoration of traffic.

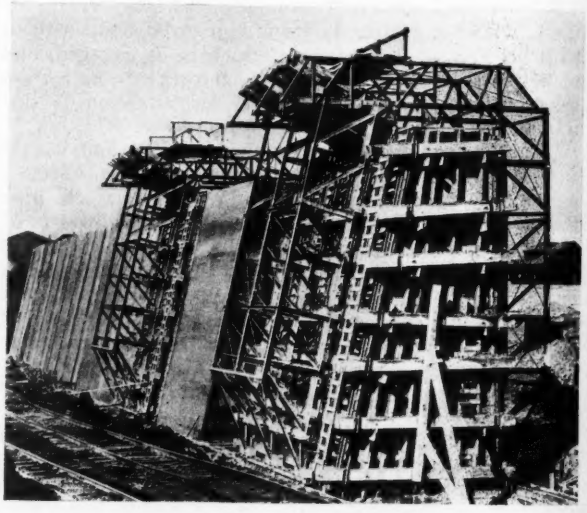
In such emergencies a personal survey of the affected territory can be made very quickly, and thus permit of perfecting arrangements to expedite the work of restoring traffic, without the delays incident to obtaining such information by the use of a locomotive, slow moving hand car, or by walking over the ground. Motor cars have been used to a great extent in piloting trains, both day and night, in derailments or other emergencies when the main tracks are obstructed.

SAVE—Your patriotic duty is in proportion to the money you earn. The more you get the more you can, and should, invest in War Savings Stamps.

AN IMPROVED STEEL FORM

STEEL FORMS for concrete construction have demonstrated their superiority over wooden forms in almost any case where the work is duplicated enough times to spread the greater cost of the steel construction over a sufficient yardage of concrete to reduce the cost of form work per yard of concrete to what it would have been with wooden forms. The steel forms give a smoother surface and can be made to afford adequate rigidity with less difficulty than with timber. Where the form work is for large masses of concrete, provision is usually made for shifting the forms on rollers or rails.

These advantages are received in the forms shown in the accompanying photograph, but with the addition of several innovations which add still further to the applicability of steel to concrete form construction. In this design, steel trusses are used to transmit the pressure



STEEL FORMS FOR A 30-FT. WALL

of the wet concrete from the faces of the forms to a series of ties connecting the forms at the top and a set of jacks anchored to offsets in the footing. Through this arrangement the use of rods passing through the concrete to resist the form pressure at intermediate points is entirely done away with. As a result the labor of placing the form is greatly reduced and nearly all uncertainty in the calculation of stresses due to the pressure of wet concrete is eliminated.

Another feature of this form is that the bulkheads used to make the ends of each unit of the concrete work are hinged to the side form, so that they can be swung out like a door after the work has been finished. This is better understood from an examination of the photograph, which indicates the method of procedure in placing the concrete work for a retaining wall which is 30 ft. high, 18 ft. wide at the bottom and 10 ft. wide at the top. Each section is 30 ft. long between expansion joints. The form shown in the foreground is equipped with a bulkhead at each end and is used to concrete each alternate section. The portions of the wall left unconcreted are filled by the second set of forms without bulkheads, which is long enough to overlap the adjoining sections already concreted, a sufficient amount to hold the wet concrete readily. These forms are made adjustable to fit different sections of retaining walls and were built by the Blaw-Knox Company, Pittsburgh, Pa.

MOTOR VS. ENGINE DRIVE FOR PUMPING PLANTS*

An Investigation of Practices and Tests of Pumping Equipment Show Advantages of Electric Drive

PRACTICALLY ALL "POWER PUMPS" designed to be driven by belt, gear, chain, or direct connection (high speed) are adaptable to operation by the electric motor. The principal conditions to be considered when choosing a pump are character and capacity of source of water supply, pumpage required, pumping head and character of the water. The principal characteristics of the pump to be considered are first cost of the complete pumping equipment involved, length of useful life, reliability and total cost of operation.

Pumps commonly used for water supply may be classed as deep well and surface pumps. Deep well pumps will be considered first. Those most capable of delivering a large flow from a deep well of moderate bore are the air-lift and propeller pumps. For a given capacity, the centrifugal requires the largest well bore.

When the water stands at a great distance below the surface, the air-lift is most reliable. Reciprocating and centrifugal deep well pumps are made for higher heads than is the propeller pump, but very long shafts on any of these three types are liable to be a source of trouble. The air-lift is best adapted to a well shaft which may be crooked or out of plumb. Water containing gritty materials and injurious chemical compounds probably has the least harmful effect upon the air-lift. Sand wears the valves and cylinder of a reciprocating pump. Centrifugal and propeller pumps do not have these parts, but impure water may cause rapid wear of the vanes in a centrifugal pump.

For a capacity of say 200 gal. per min. and a head of say 100 ft., the first cost of a centrifugal pump is higher than for any of the other three types of deep well pumps, and the first cost of the air-lift (including compressor) is the lowest. Certain requirements, depending upon the type of pump, such as a larger well casing, a higher motor horsepower and a lower motor speed, all increase the first cost of the complete installation.

A higher pump efficiency allows a smaller motor and reduces the power cost. In ordinary operation, the above four types of pumps generally have the following order as to efficiency: reciprocating (high), centrifugal, propeller, air-lift (low). Cost of attendance and repairs depends upon pump capacity and upon the type of pump chosen for a certain set of conditions.

The most commonly employed types of electrically driven surface pumps are the vertical cylinder single acting plunger triplex pump and the horizontal shaft centrifugal pump. Double acting piston pumps and rotary pumps are sometimes used. The single-stage centrifugal pump is generally suited for low heads and large capacities as compared with the triplex plunger and piston pumps, and with the rotary pump. The centrifugal pump is best suited for handling water containing gritty material and small solids. Triplex pumps are higher in first cost than the common surface centrifugal pumps. The first cost of rotary pumps has a wide range, depending upon the quality and make, but it is lower than that of triplex pumps.

For moderate and high heads the power cost is lower and the efficiency higher for triplex and rotary pumps than for single-stage centrifugal pumps. Also a triplex or a rotary pump, operated at a constant speed with a range of head, maintains capacity and efficiency much better than does a centrifugal pump.

As to reliability, the centrifugal pump has fewer parts to get out of order than has the triplex pump, but the high speed of the former demands careful alinement of shaft and attention to bearings. The triplex pump is generally considered more reliable than the rotary pump. For fire service, the electrically driven underwriters' multiple-stage centrifugal pump is comparatively simple and reliable.

TABLE 1

RANGES OF PRICES AND RATED EFFICIENCIES OF DIFFERENT TYPES OF PUMPS

(Prices quoted in 1916)

DEEP WELL PUMPS

Specified capacity, gallons per minute	100	200	400	500
Specified head	100 ft.	100 ft.	100 ft.	100 ft.
1. Reciprocating:				
Rated efficiency	82.3%	70, 82%	....	....
Price, dollars	600	1,060, 1,100	....	....
2. Centrifugal:				
Rated efficiency	....	48%	....	55-67%
Price, dollars	....	1,350	....	1,496-1,687
3. Propeller:				
Rated efficiency	....	25-30%	30-35%	....
Price, dollars	....	1,200	1,600	....
4. Air-lift:				
Rated efficiency	....	30%	....	30%
Price, dollars	....	745	....	1,170

SURFACE PUMPS

Specified capacity, gallons per minute	200			500		
Specified head	50 ft.	100 ft.	200 ft.	50 ft.	100 ft.	200 ft.
5. Plunger (triplex):						
Rated efficiency	....	67-75%	77, 78%	....	.....	82, 83%
Price, dollars	....	850-340	725, 412	....	.....	1,525, 900
6. Piston (triplex):						
Rated efficiency	....	70%	.....	....	.....	.....
Price, dollars	....	750	.....	....	.....	.....
7. Centrifugal:						
Rated efficiency	56%	55, 58%	62, 64%	68%	64, 67%	56, 69%
Price, dollars	177	100, 177	450, 420	315	115, 315	435, 640
Rated capacity, gallons per minute	90	300	450	....	100-175	.....
Specified head	100 ft.	100 ft.	100 ft.	....	100 ft.	.....
8. Rotary:						
Rated efficiency	65%	65%	65%	....	50%	.....
Price, dollars	55	115	140	....	250	.....

OBSERVATIONS FROM PRACTICE

The present trend indicates that when reliable electric current is available, it is gradually replacing other forms of power for pumping. The steam pumping plant is usually under local control and some consider power from such a plant more reliable than current received over a transmission line. With reliable current electric pumping results in general satisfaction because of the low investment in power machinery and because of the convenience and low cost of attendance. With undependable current or unsteady voltage, electric pumping causes dissatisfaction and possibly a return to steam pumping.

For small installations the deep well reciprocating pump is most commonly used, and, when the lift to the surface is moderate, the same pump delivers the water into an elevated tank or pneumatic pressure tank. Air-lifts are employed for very high lifts and under other conditions not suitable to other types of pumps. In practically all cases, when used, the air-lift pumps only to a surface reservoir.

Pumps are seldom installed in deep wells of more than

*Extracts from Bulletin 46, Engineering Experiment Station, Ames, Iowa, by H. W. Wagner, mechanical and electrical engineer.

20 in. in diameter. Additional wells are drilled when more capacity is required. Various types of pumps are installed in these wells. A number of deep well pumps may feed into a common surface reservoir from which the second-stage work is done by high pressure pumps. Centrifugal pumps are often used for pumping from streams and lakes against low and moderate heads. Second-stage electric pumping is generally done by single acting triplex pumps.

The same points should be considered when one is choosing power for pumping as when choosing type of pump—first cost, length of useful life, reliability and total cost of operation. Steam, gasoline and oil engines are all competitors of the electric motor.

First cost means high fixed charges which should always be included in the total pumping cost. Power plants are arranged in the following order as to first cost: steam (high), oil, gasoline, electric motor (low). Steam pumps and pumping engines and electric motors are likely to have a longer useful life than oil and gasoline engines.

Steam is generally considered the most reliable of all types of power. Electric power is sometimes placed second, not because the motor itself is inferior to the steam plant, but because the motor must depend upon the electric central station and connecting lines. Gasoline engines require less skillful attention than oil engines and for that reason are more reliable. Comparative total costs of operation with different types of power offer a subject for debate, but the true answer depends largely upon the amount of power required and upon other conditions.

When the costs of fuel only are compared with the cost of electricity, the high efficiency oil engine takes the lead. Except for small plants coal costs are lower than gasoline costs. Cost of electric current per 1,000 gal. of water pumped depends partly upon the rate per kilowatt-hour. For large plants it is often higher than coal cost and for moderate sized plants it is likely to be higher than the fuel cost for an oil engine. Fuel costs comprise only part of the total cost of operation by engines. In general the different kinds of power may be arranged as follows in reference to total cost of attendance, lubrication and repairs: steam (high), oil, gasoline, electric (low).

Electric pumps are adaptable to remote and automatic control and thus may effect a big saving in operating expense. A careful study and analysis of the average problem indicates that with a reasonable rate for current, pumping by electricity results in a lower total of fixed charges and operating expenses than does pumping by any type of engine. In the following section is a summary of costs of electricity for pumping:

Electric Pumping Costs

The following is a summary of operating records of a number of pumping plants:

	Approximate average	Approximate range
Single stage pumping:		
Daily pumpage, gallons	260,000	40,000-1,000,000
Total head or lift, feet	155	14-305
Kw-hr. per 1,000 gallons (18 plants)	1.08	0.50-1.82
Rate in cents per kw-hr	3.58	1.5-6.0
Double stage pumping:		
Daily pumpage, gallons	66,000	25,000-135,000
Total head or lift, feet	300	150-525
Kw-hr. per 1,000 gallons (6 plants)	4.39	1.16-9.00
Rate in cents per kw-hr	3.15	1.7-5.0

From the wide range of kw-hr. per 1,000 gal. (0.50 to 9.00) and of rates per kw-hr. (1.5 cents to 6.0 cents), it is evident that the cost of current per 1,000 gal. has a very wide range. Individual reports show this cost to range from 1.25 cents to 15.0 cents with an approximate average of 5.3 cents. The higher costs are in cases of two-stage pumping when the air-lift is used for the first stage. In fact, four out of the six two-stage plants included in the tabulation employed the air-lift.

Cost of attendance, lubrication and maintenance for electric pumping cannot well be summarized for the general case, but it is usually a small fraction of the cost of power. Fixed charges on the pumping machinery are also usually less than the cost of power.

Selection of the Motor

The comparison of electric with other forms of power for pumping is not greatly different from the comparison of different types of power for general industrial purposes. The advantages of electric drive are more pronounced in the case of pumping when the individual plant is small, when the pumping plant does not receive constant attendance, or when exhaust steam or heat is of practically no value.

Some general advantages of electric motors over all engines are simplicity of construction and operation, low first cost, small space required, quiet running, little attendance required and convenience of various kinds of control. For reliable operation, however, the motor must be supplied with a steady uniform current. The comparative economy of motor pumping often hinges on rates for current as compared with fuel costs.

An electric motor is a very reliable power machine, but is subject to ills if abused. It must be securely fastened in true position to a solid foundation. Bearing troubles may result from poor adjustment, dirt in the bearings, insufficient lubrication, or a strain upon the shaft not in the direction for which the motor is designed. The insulation may weaken if subjected to undue heat, dampness, or dirt and dust. The windings should be protected from overloading, and consequently overheating, by fuses or a breaker in the supply circuit. A motor is subject to injury if suddenly given much voltage at starting. This is especially true if the start must be made with a heavy pull, which should be avoided if the installation permits. A direct current motor is subject to commutator ills when the commutator and brushes are not kept clean and adjusted.

Most pump troubles appear as breakage, excessive wear, loss of priming, excessive slip, or loss of efficiency. Causes of breakage to be obviated are normal or accidental pressure in excess of that for which the parts are built, water hammer, too high a speed, sudden acceleration of speed by the driving power, solids in the water, overtight packing and freezing. To obviate excessive wear, lubrication must be positive and the right grade of oil or grease must be chosen for each bearing.

The remedy for loss of priming, in case the original installation was correct, may be to renew valves or packing or to stop possible air leaks into the intake. Excessive slip or loss of capacity per revolution with reciprocating pumps may be caused by lack of water, by valves which are worn or do not properly seat, by loose packing, or by worn pistons, plungers or cylinders. A pebble or other solid body lodged between a valve and its seat will allow much leakage. The capacity of a centrifugal pump will reduce if the vanes become clogged or if the speed becomes too low for the head. Loss of efficiency means that a greater per cent of the power input to the pump is wasted in machine and water friction. Practically all the pump troubles mentioned above lead to such loss.

Economical operation of the air-lift system depends primarily upon the equipment and installation as fitted to conditions, and secondarily upon skillful mechanical care of the compressor.

Two Tractor-Drawn Grading Outfits at Work

BUILDING A 7-MILE RAILROAD IN 32 DAYS

The Nashville, Chattanooga & St. Louis Forces Made This Record on Construction of a Government Line

THE CONSTRUCTION of the Old Hickory powder plant on the Cumberland river near Nashville, Tenn., at a distance of 7 miles from the nearest railroad, made it very important that a spur line be completed at the earliest possible date. Such a line was built by the combined efforts of the construction forces of the Nashville, Chattanooga & St. Louis and the Mason & Hanger Contracting Company, contractors for the construction of the powder plant. The new line is the property of the government and the railroad's participation in the construction work came about through the fact that the Lebanon branch of the Nashville, Chattanooga & St. Louis is one of two lines approaching nearest to the powder plant and because John Howe Peyton, president of the railroad, realized the opportunity for the road to do the country a real service and tendered the good offices of his company for that purpose.

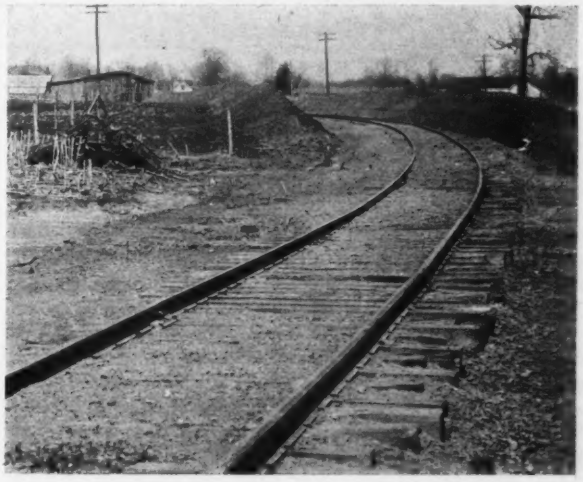
The Lebanon branch of the Nashville, Chattanooga & St. Louis and the Tennessee Central occupy approximately parallel locations in a direction almost due east from Nashville, the former to the south of the latter. The Cumberland river lies just to the north of these railroads, but winds its way westward through a succession of horseshoe curves which form large peninsulas projecting alternately to the north and to the south. The new powder plant occupies a large tract of land at the north end of one of these peninsulas on the south side of the river in what is known as Hadley's bend. The distance from the yard at the plant to a connection with the two railroads is roughly seven miles.

The intervening country is rolling, entailing considerable earthwork and no small amount of skill in locating either the most economical line or the one capable of the quickest construction. At present the traffic is practically all inbound, but even after the operating traffic has replaced the movement of construction materials, the bulk of the tonnage will be inbound, i. e., raw materials for the manufacture of explosives. In view of this, it was deemed desirable to have a 0.5 per cent maximum grade against inbound traffic, whereas short reaches of 1.5 per cent grades were considered satisfactory for the outbound movement, so for the sake of speed in construction it was decided first to build a line having a maximum of 1.5 per cent grades in both directions, this to be used later as an outbound line when a second track could be finished having not more than 0.5 per cent grades against inbound movements.

Unfortunately, the first 1½ miles of this line was by far the most difficult, involving a trestle 2,000 ft. long and a rock cut of 23,000 cu. yd. close to the main line connection, so after building 700 ft. of this trestle it was concluded that better progress could be made by building a temporary detour line on a 2 per cent grade as far as station 82, this line to be abandoned after a double track line with 0.5 per cent grades could be built from station 0.0 to station 82 on the final location.

Large Force Employed

Although the burden of pushing the work through was largely on the railroad, the work was more or less divided between the road and Mason & Hanger, the contractors. The railroad completed all the grading and trestle work from the connection with his track to the government property line, 4½ miles, while the contractor did equivalent work north of that point, but the railroad completed all of the track lying on the first main line with its own forces for the entire 7.1 miles to the throat of the powder plant yard.



A View of a Part of the Completed Line

Before the project was completed the railroad was employing 3,000 men on the 4½ miles of line. Fortunately plenty of men were available, largely because the extremely cold weather had delayed spring work on the farms. The close proximity of Nashville was also of an advantage since a large part of the force was recruited there, although labor agents at Paducah, Ky.,

and Memphis, Tenn., supplied large numbers. The nearness of the large city was also of advantage in another way since it obviated the necessity for feeding and housing the men on the work. With the exception of the regular construction forces of the railroads, these men were all hauled to and from their work each day in special trains, two on the Nashville, Chattanooga & St. Louis and one on the Tennessee Central.

The men were supplied quicker than the materials and equipment, so resort was had largely to the pick and shovel. The cuts were wasted and the fills were borrowed by gangs of men working almost shoulder to shoulder. As the days passed by more modern methods of construction were instituted. Men and equipment of the construction department of the railroad employed in building an extension of the Tracy City branch in the Cumberland mountains were sent to the work. This embodied six extra gangs and five bridge gangs with their camp equipment and a type 70 C. Bucyrus shovel, the latter arriving on the work on February 12, when it was moved out over the track already laid to station 150, then across a field to station 162 into a small rock cut. A Bucyrus pile driver, locomotive crane, six steam drills and a boiler were also brought in at the same time. The extra gangs were used very largely on the track work and the carpenter gangs on the construction of the pile trestles.

The contractor used more power equipment, which was moved in on the work from time to time as it proceeded. This equipment included two tractor-drawn graders and two Bucyrus caterpillar shovels with ⅞-cu. yd. dippers and 400 teams. They were used largely in a 60,000-cu. yd. fill near the far end of the line, made principally from barrow.

GATHERING OF MATERIALS

The accumulation of the necessary materials was a large problem in itself. The temporary line was laid with 57-lb. relayer rail, while all the remaining main line rail was 80 lb. In the yard at the plant the contractor laid 57-lb. Russian rail. The problem of supplies involved not only those needed for the initial seven miles of main line, but materials had to be hauled in simultaneously for the second track and the yard tracks at the plant. For instance, the railroad company furnished 20,000 ties out of stock for use in the first line, but while this material was being supplied the company's purchasing organization was busy gathering 175,000 standard ties, 135,000 narrow-gage ties and 160 sets of switch ties for the use of the plant contractor.

Lumber and piles were also required for the trestles, one of 700 ft. and another 100 ft., which were needed at once, additional trestle material being required for the second track. The piles for the big trestles were brought from the various divisions of the road in Tennessee. The first piles driven were telephone poles which the railroad had purchased for the construction of a telephone line, while the majority of the piles were cut from the woods and brought to the work.

To facilitate the handling of supplies one of the first steps taken in the work was to build a material yard with adequate trackage just north of the connection with the Tennessee Central. Until a considerable portion of the track was built, practically all of the material was despatched from this yard to points on the line by motor trucks. At the end of 32 days the track was ready to carry traffic into the plant and the railroad's part of the work was over. The railroad's work was handled by the engineering department of the Nashville, Chattanooga & St. Louis, of which Hunter McDonald is chief engineer. Direct responsibility for the progress of the work fell upon Leigh Taliaferro, construction superintendent, while the gathering and despatching of materials to the work was carried on by various members of the organization, including C. M. McDaniel, tie and timber agent.

AN 800-FT. TRESTLE COMPLETED IN FOUR DAYS

CO-OPERATIVE BOARDING CAMPS

BY ENGINEER

IT IS FAIR TO SUPPOSE community living to be one of the oldest of the world's institutions. Certainly the co-operative stores and community kitchens of Europe are by no means new institutions. Most civil engineers are familiar with the monthly camp accounts for food, and the troubles of the mess president when the bills come in. There is no doubt that under ordinary circumstances the community plan of living is most economical, as well as most satisfactory to the greatest number. Europeans employed as track laborers on American railways usually elect to get and cook their own food. There seems no reason why the same plan may not be adopted successfully by American railway laborers under proper supervision, with all the advantages of sanitation, discipline and clean living.

There is a distinct advantage in the co-operative boarding plan where the number of persons is small. Boarding contractors depend on large numbers of boarders for their profits. The necessary investment in equipment, stores, cooks and helpers demands a considerable turnover before a fair return can be realized. When the number of boarders dwindles, the contractor economizes, the men object to scant food, the cooks are disgruntled

and there is trouble all around. When the food is bought and paid for by the men themselves there is no cause for complaint, because they can get what they want. An important consideration in favor of the co-operative plan is the conservation of the food supply. Every man in the gang is vitally concerned in keeping down the cost, in eliminating waste, in having food properly cooked and in having as nearly what he wants and needs as is possible for the money expended.

The writer has knowledge of several bridge, building, paint and concrete gangs of from 8 to 20 men each, all of whom have lived under the co-operative system for the past 5 years without the slightest complaint. The railway company furnishes cars and equipment complete, and pays the cooks. The foremen are the mess presidents. They handle all food bills, prorate total expenses among the men, and obtain payment through pay roll deductions. There is a stated charge for single meals. All transients, including railway employees, officers, train crews and outsiders who must occasionally be fed, are charged for food at this rate without exception. If possible, the wife of the foreman or of some man in the gang, is hired as cook. If any helper is needed he or she is hired and paid by the mess. The cook is supplied with transportation, which enables her to go to nearby towns to purchase supplies.

It is found necessary to lay off these gangs in winter at times, but the foremen and cooks are kept in the cars if possible, the foremen sometimes working as laborers. The expense of keeping cars inhabited and watched is less than that of closing the cars, storing the equipment and starting the cars out anew when wanted. The railway company keeps these cars in repair and makes the cook and foreman responsible for keeping them clean. The results are such that they are the most desirable boarding places along the line. A first-class plain meal can be obtained for 35 cents and the men live for a little less than 30 cents per meal.

This arrangement saves the company many dollars in the yearly labor turnover, as well as in office supervision. The success of this plan depends, of course, on the integrity and efficiency of the foreman.

Methods of Painting Steel Bridges*

BY H. S. BIRD,
Master Painter, Philadelphia & Reading, Philadelphia, Pa.

THERE IS NO FORM of steel construction that is more subject to corrosion than a railway bridge. It is subjected to the corroding influence of the locomotive gases, the moisture of steam and weather, the drip from refrigerating cars, and the more or less continuous moisture of rain and snow on those parts from which water will not drain readily. It is also subjected to extreme changes of temperature.

Bridge painting is not an easy operation. In many places bridges are designed so that the scaffolding necessary for painting is very difficult to erect and often the operation of painting itself is quite dangerous. Nevertheless, the painting must be done. Perhaps, by co-operation with the maintenance of way master painter, the bridge engineer could obtain valuable suggestions in the matter of design that would make painting more easy and effective. If a part of the surface of a bridge to be painted is not reasonably accessible, it can hardly be expected that it can be painted in a manner that will protect the steel properly.

The bridge painter, in his capacity as an inspector, will often note that certain parts of a bridge are more corroded than others. These parts will require more careful cleaning and more thorough painting. Some of the tendencies of certain parts of a bridge to corrode may be corrected by a change in the design of future structures. In many cases, however, the bridge engineer is helpless, for the tendencies to corrode at certain parts will occur in any design, and no change of design will give relief. With these bridges it is up to the bridge painter to do the best he can and try to protect the structures by superior painting. For instance, it is claimed by some that horizontal surfaces are more liable to corrosion than vertical surfaces, the reason being that water tends to remain on horizontal surfaces.

It is well known that rivets and bolts tend to corrode or to make the metal around them corrode. This may be caused, as some may claim, by differences in the composition of the metal. It may also be due to the fact that rivets and bolts project and therefore are more subject to wear, or it may be that they cannot be painted as thoroughly as flat surfaces. It is well known that unless adequate precautions are taken corrosion will take place at the jointure of two pieces of metal. This is probably due to capillary attraction which the joints have for water. Good practice has overcome this difficulty, however, by filling between the surfaces at the joints with a heavy red lead paint.

We must consider, however, not merely the corrosion of the steel, but the destruction of the paint, for if anything destroys the paint the steel is exposed to corroding influences. Locomotive cinders from stacks or ash pans, falling upon the paint, may burn it in spots and partially destroy it, so that where such destruction occurs the metal may commence to corrode.

METHODS

Painting should be made easy and the paint should spread easily, but if this thought is carried too far, the service of the paint will not be satisfactory. A paint, for protective purposes, should be well brushed in and not flowed on. A paint designed to flow on easily should never be used for the protection of iron and steel. The practice of adding turpentine or petroleum thinners in order that paint may be applied more easily is, beyond a certain point, a bad practice.

Of great importance is the proper selection of paint. Red lead is the most desirable for rusted or corroded portions, followed by one or two coats of railroad standard specification paints. One of the most important factors in painting iron and steel is the continuity of coat. A continuous coat is one that completely covers the surface painted. Where the surface painted is of the same color as the paint applied, it is practically impossible to insure perfect continuity. The more the color of the paint differs from the surface under it the easier it is to secure continuity of the paint.

The usual practice in painting a new structure is to apply pure red lead and oil as a first coat. This coat is

*Abstracted from a paper presented before the last convention of the Maintenance of Way Master Painters' Association.

a great contrast in color to the surface of the metal painted. With modern, high-grade red lead paint, it is easy to see that the work has been done properly. After the first coat has been applied a careful inspection should be made and such parts of the metal as have not been completely coated should be touched up. Where there are openings or crevices between parts of metal, these also are filled in with the paint.

Time must be allowed for the first coat to harden and mature before applying the next coat. Past practice would indicate that this time should not be less than one week, and it should be more in damp weather. The bridge should then be ready for another coat of paint, which should differ in color from the first coat. Red lead may be used again by adding a small amount of lamp black, as it will then have a chocolate color, in sufficient contrast to the paint already on the bridge, so that good work can be obtained. Red is the standard danger indication. So bridge engineers do not wish the finishing coat of bridges to show red. Therefore dark brown or black coats are preferred by those in authority on most railroads.

Every painter knows that good painting can be done only when the surface to be painted is in proper condition; and also, that the paint film should be smooth, uniform and complete. But on the other hand, we have seen great, costly and important bridges having deep members with no means of access to large parts, and they can be painted only with a brush lashed to a long stick or pole. In such cases, it is obvious that no proper inspection is practicable. The remedy is in the provision of strong bolts terminating in large eyes at points where they could serve to swing scaffolds.

The erection of permanent, fixed scaffolding is troublesome and expensive, but if some means were provided by which easy access could be given to any part of the bridge, inspections might be made once, or if necessary, twice each year, and rusty places scraped and repainted. This is cheaper and better than repainting the whole structure after it has been allowed to get badly rusted, for the cleaning costs more than the painting and is more likely to interfere with traffic.

There never has been a time so important as the present for keeping bridges in good condition because of their excessive cost. It is true that paint is high in price, and so is labor, but steel is still higher. A dollar's worth of steel can be painted for less money than it ever could before; and it is really the dollar's worth which we are trying to save by painting. Let us take care of our old bridges, because it costs excessively to replace them, and because we do not want to take them down just now; and let our new ones be painted with the best materials, with real painstaking care, and if possible have them made so that it will be easier and cheaper to care for them than it has been in the past. This, if we can do it, is real progress and conservation.

Maintenance of Way Safety Inspection

BY P. H. HAMILTON.
Roadmaster, St. Louis-San Francisco, Sapulpa, Okla.

THE RAILROADS have made great strides in the prevention of injuries during the past six years through the media of committee meetings, stereopticon views, moving picture shows, lectures, illustrated circulars and bulletins, commonly known as "Safety First" work. However, the meetings, now so common, are generally attended only by a few loyal employees at terminals. Few of the brotherhood men are present, as they are not on duty when the meetings are held, and they are too indifferent to attend the meetings on their own time. This indifference on the part of a large number of the employees is the greatest retarding factor which is now commonly encountered in advancing the principles of safety work.

Another handicap is the fact that station men and maintenance of way and other employees at outlying stations are seldom able to attend these meetings. All their information is received in circulars from time to time, but there is always something lacking in these circular letters, and they do not infuse the men with the "pep" or the interest that personal contact creates. Letters of this kind are taken as a matter of course, and receive about as much attention and excite as much interest as the directions on a spike keg.

In order to bring this before the men on the St. Louis-San Francisco individually it was decided to appoint three safety inspectors, who report to the superintendent of safety. In July, 1916, a trainman and a shopman were appointed to work in the departments with which they were most familiar. Later a maintenance of way man was also appointed. The latter inspector goes over the road on a motor car in company with the roadmasters, talking to the men at work and reporting conditions or irregularities pertaining to safety. In six months he has traveled over the entire Frisco lines and has talked to every section and extra gang foreman. He has visited a large number of the gangs a second time in this period.

The safety inspector meets the roadmasters, the section and extra gang foremen, and their men. He calls their attention to unsafe practices in doing their work, to defective and dangerous tools which they may be using, and to unsafe conditions which exist and which are under their supervision; and he talks to them in a general way along the lines of the Safety First campaigns. By coming in touch with the men individually out on their work he is able to get results and to secure better co-operation. It is also his duty to draw the men out, to get suggestions from them, and to cause them to think along this line.

All maintenance of way men agree that the Safety First movement is a good thing; but they are indifferent, and are not inclined to expend any energy along that line. A foreman will consider it as a side issue, and he devotes little thought to it. However, if he sees that the roadmaster, or some other higher officer, is behind the work his interest grows, and through him we may expect some gratifying results.

Periodic inspections are made by the safety inspectors in a systematic manner and with something definite in view. In addition to talking with the men, the results are tabulated and brought before the various officers for their information and action. Comparisons are made of the conditions in the various shops, or on the different sub-divisions. These are analyzed and used in the stimulation of rivalry among the men, for men who do not look at this in a sentimental mood may be reached by creating competition among them. No discipline is assessed in conducting Safety First work, and it is neces-

sary to get the support of the men by touching their sentiments or by working on their pride and creating a competitive spirit in remedying unsafe conditions and practices which the safety inspectors bring to their attention.

Injuries to employees may be divided into three classes, resulting from (1) obstructions or from the physical conditions of machinery, equipment, etc.; (2) the carelessness of single men working in unison with other employees, and (3) the carelessness of the injured party. However, we may charge all of these injuries to the foreman in charge, for not cautioning his men, or for not being on the alert for obstructions, or for defects in equipment. If the maintenance of way book of rules, and other instructions, are observed closely a great reduction in personal injuries will result. Our rule books cover the situation almost completely, but although the foremen may read the book through, they do not always grasp the meaning or the importance of the instructions, and in a short time they do not remember or recognize the rules, a large number of which are safety rules.

Also in hiring foremen, not enough attention is given to their qualifications other than their ability to do good work. For instance, a roadmaster hires "Bill," furnishes him with a switch key and a rule book; tells him of a few places in his track where he may look for trouble; and, with a few other admonitory instructions, "Bill" starts to work. The roadmaster watches his track and gives him instructions from time to time. If "Bill" is a first-class trackman he may be more or less neglected by the roadmaster, and he will not receive the benefit of personal instruction. "Bill" builds some rests for motor cars along his section. He constructs them according to his own idea, and they look well, although they do not comply with the standard shown in the book of rules. He does not provide the proper clearance, and an accident results on account of the rest being too small and a car being placed too close to the track. Again, he sets a sign post according to his own judgment instead of observing the instructions. The post is broken and falls in the public crossing, resulting in another accident. Then it develops that "Bill" does not know what is in the book of rules. He has not studied it, and he does not refer to it in his work. After three years' service "Bill" is caused to realize that he should familiarize himself with all rules, and to observe them to the letter.

Where the roadmaster or other superior officer is forceful in issuing instructions, and impresses everyone with the necessity of observing all rules, he is a great factor in safety work. Instructions and standards should be adopted with the understanding that they will be observed strictly, or else they should not be issued at all, for rules not enforced cause indifference. Men will observe the safety rules when convenient, but they are wont to take chances when it is possible that by exercising a little more caution they will slow up the work. The present days are strenuous ones for the maintenance of way man, and he is prone to neglect those things which he does not deem absolutely essential to the progress of the work at hand, although what they sometimes deem non-essentials are very important from the safety standpoint. The foreman regrets accidents or injuries to men in his gang, but he is often negligent in the anticipation of these accidents. He seems to consider them as a matter of course; but on investigation we find that a large per cent of "unavoidable" accidents could have been prevented by a little foresight and by the exercising of caution by the man in charge.

One of the duties of the safety inspector is to point out and impress upon the men the necessity for caution and the observance of the safety rules. He must be patient and persevering to get results. The foreman out on the work without flagging tools tells you that the men left them off the car that morning, although it is his personal duty to see that he is properly equipped when he starts out. Some receptacle should be fastened to all hand and motor cars in which to carry torpedoes and flags, where they can easily be seen, and where it will not be necessary to remove them except for use. The old-time foreman tells you when you find him with the track obstructed and with insufficient protection, that he has been employed at that work for a large number of years, and has never had any trouble from that source. He points with pride to his record of long-continued success. However, he can be made to realize that his great success is not the result of his carefulness and his strict observance of the rules, but it has been pure luck; and he will realize that if he does not chance his methods his luck may change.

The class of labor generally handled by track foremen is transient, ignorant and sullen, and not responsive to training, or to efforts to educate them individually. Therefore it is necessary for the foreman to always be on the alert, and to watch each individual very closely to insure his safety. Large numbers of men are injured by the racing of hand and motor cars or by running them too close together. Men have their feet mashed and legs broken getting on and off the sides of motor cars in motion. In large gangs these reckless practices are hard to stop, if allowed to get started, but they can be stopped by the use of a little vigilance and discipline on the part of the foreman. Men are injured handling heavy material because they have not been properly coached in the method, and are not working in unison. The foremen often permit, and sometimes insist on, their using defective tools, contrary to the wishes of the management; when by being foresighted and using judgment they may have good tools on hand at all times.

While his work is principally the maintenance of track, a foreman should be alert to note conditions and unsafe practices on the part of the employees of other departments and the general public. He should report these to the proper authority, or else take steps to remedy them himself. Although it is the standard everywhere to keep obstructions back at least six feet from the track, he will sometimes allow buildings to be constructed with less than the standard clearance. Again, in spite of the fact that he keeps his yard and tracks free from material and rubbish, he will permit the owners of industries along the tracks to pile coal, lumber and other materials too close to the track. He is often backward about approaching patrons of the road, and will allow hazards to exist on that account. Here is a chance for him to show his ability, and if he handles these people right he will get results. Of course, there are parties who will not co-operate, and it may be necessary for the foreman to move the obstruction with his own men, although in cases of this kind he should prepare a statement of the cost and forward it to his roadmaster, who will request the accounting department to render a bill against the parties at fault. Although the bill may not be collected, its presentation will have a good moral effect on the firm which insists on piling material too close to the tracks.

The duties of the section foreman are so many and are so varied that many of these things will escape the most observant among them. To make them enthusiasts in the safety movement we must set them an earnest example. We must necessarily be patient, and must not let our efforts lag.

Instructing a Yard Gang

MAKING AMERICANS ON THE RAILROADS*

The Pennsylvania Is Making Special Efforts to Nationalize Its Foreign Employees

BY SAMUEL REA,
President, Pennsylvania Railroad System

THE MANAGEMENT of the Pennsylvania Railroad System has consistently endeavored to solve the problem of Americanizing its foreign-born workers along purely practical lines. The task has proved to be one of very considerable magnitude, as may be judged from the fact that there are at present, on the whole system, both east and west of Pittsburgh, over 33,000 men of foreign birth. Before the war this number was greater by some thousands. It has been very materially reduced, of course, by the large number of unnaturalized foreigners—principally citizens or subjects of the Allied governments—who have returned to their homes in the last three years to take part in the defense of their respective countries.

This drain on the supply of foreign-born laborers has, in fact, been one of the most serious difficulties encountered in maintaining a sufficient working force under war conditions.

On the Pennsylvania lines east of Pittsburgh about 16 per cent of the total employees are of foreign birth at the present time. On the lines west of that city, operating chiefly in Ohio, Indiana and Illinois, the proportion is somewhat smaller, but it is still quite material. Of the more than 33,000 foreign-born men working on the entire system, about 25,700 are employed east of Pittsburgh and 7,500 west of that point.

Some years ago, prior to the commencement of the great conflict in which the United States is now one of the leading participants, a canvass was made of the alien employees on all portions of the Pennsylvania System. This investigation showed that Italians greatly predominated in numbers. To-day they make up nearly one-third of all employees of foreign birth east of Pittsburgh. It was found also that while large numbers of the Italians could not properly be termed illiterate, since they could read and write their own language, they were nevertheless unable to understand English at all, either in written or spoken form.

With the feeling, for these reasons, that Americanization work was more urgently needed among the Italians on the Pennsylvania Railroad than among the representatives of any other nationality, a correspondence course in Italian-English was inaugurated on the lines east of Pittsburgh.

This work was placed in direct charge of a native-born Italian, who is also a graduate of Yale, and is an enthusiast on the subject of Americanization. A similar course in Italian-English has also been established, under the charge of a native-born Italian, on the lines west of Pittsburgh.

The original purpose in establishing these courses was to make Italians, who are largely employed in track maintenance gangs, more efficient workmen by teaching them the English language so that they might better understand the orders of their foremen. The language courses are also utilized to instruct the men in the proper use of their tools, and in the fundamentals of safety, health and sanitation to aid them in raising their standards of living.

For this reason all of the language lessons, beyond the most elementary, deal with practical subjects. As the course advances the work consists largely in rendering from Italian into English brief instructions relative to the use of tools and implements, and information regarding

*The statement abstracted here was furnished by Mr. Rea to Franklin K. Lane, secretary of the interior, following the Americanization Conference, called by Mr. Lane, and held April 3, 1918, at Washington. It tells some of the methods adopted, and results achieved, in persuading and fitting foreign-born employes in the track and other departments of the Pennsylvania Railroad to become loyal and useful citizens of the United States.

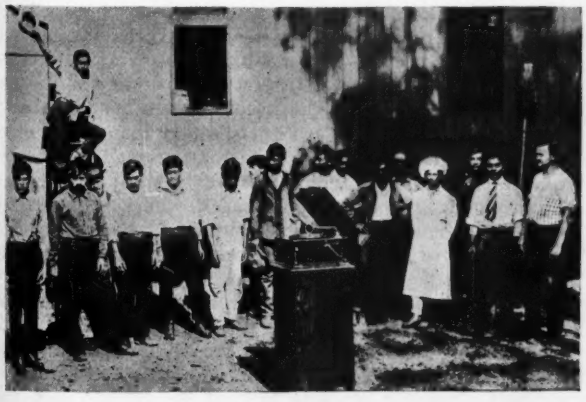
the proper method of laying and repairing track and the fundamental safety rules. One entire pamphlet is devoted to the use of signals and signal rules, and two others to the use of track tools.

Altogether there are eleven pamphlets in the Italian-English course, and the last one of the series is devoted to the subject of naturalization. On February 20, 1918, there were 4,307 students enrolled in the Italian-English course on the lines east of Pittsburgh alone, or more than one-half of all the employees of Italian birth working on that portion of the Pennsylvania System.

Experience on the Pennsylvania Railroad has shown that the best results in endeavoring to teach foreign-born employees the use of the English language are attained by measures which will practically compel them, in the course of their every-day work, to accustom themselves to speaking and thinking in the new tongue. For this reason information especially intended for employees of alien birth is usually printed in English instead of in their own language. Practically every gang of workmen has at least one man besides the foremen who can read English. Printed information in English is deciphered by him and explained to the others, so that the double purpose is served of imparting useful information and at the same time giving a language lesson.

In a similar way, lectures on safety and similar subjects, while necessarily given at times in Italian and other foreign languages, are always accompanied by lantern slides and other illustrations in which English words are used.

After the first few months of the war, the labor situation in this country became very acute and it was necessary for the Pennsylvania Railroad to find and open up new and hitherto untouched sources of labor supply. After careful investigation a considerable number of Mexicans were induced to enter the service. They have been chiefly located along the main line between Pitts-



MUSIC IN CAMP

burgh, Philadelphia and New York. While they have been found efficient and satisfactory workmen in the whole, they, like the Italians, were greatly handicapped by the fact that few could speak any language except their native tongue, which is Spanish. To meet this condition, therefore, a special course in Spanish-English was prepared for the Mexicans, similar to the Italian-English course. On February 28, 1918, there were 451 Spanish-speaking employees learning English in this way.

The Mexican laborers have been chiefly concentrated in camps located at various points along the lines. All modern features to promote sanitation and health are adopted. In addition, provisions have been made for amusements and recreation, including camp recreation rooms, victrolas, etc. Instructive entertainments are given from time to time, under the auspices of the Young Men's Christian Association. Wherever possible religious services for the Mexican employees are conducted under the direction of a Catholic church.

In addition to the language courses carried on through the educational organization of the Pennsylvania Railroad, instruction is also provided, by correspondence, in electricity (including elementary mathematics) and in stenography. Altogether, out of approximately 166,000 employees on the lines east of Pittsburgh, 18,769, or 10.7 per cent of the total, were on February 28, 1917, enrolled in the educational courses.

While a large proportion of these students, outside of the language courses, are naturally men and women of

TELLING THE MEN ABOUT THE LIBERTY LOAN

American birth, a considerable number of foreigners are also included in the other courses, especially such men as have mastered the language work and so fitted themselves for advancement to foremen, and are now preparing for further progress by educating themselves in some of the more technical matters relating to railroad operation.

Supplementing the correspondence courses, numerous safety lectures are conducted solely for the benefit of alien employees. To sustain interest in these efforts and to combine entertainment with educational features, considerable time and money were spent in the preparation of a moving picture film, entitled "The Americanization of Tony." (Described in the *Railway Maintenance Engineer* for April, 1917, page 126.)

While special efforts have been devoted to the Italians, on account of their great numbers, Americanization work has also been directed among the employees of the other foreign nationalities represented in the working forces of the Pennsylvania Railroad. Broad opportunities along these lines have been, of course, presented in connection with the Liberty Loans.

During the offering of the first and second Liberty Loans systematized campaigns were carried on among the alien workers with substantial and gratifying results. Some of the figures applying to the first loan will be sufficient to indicate the extent to which participation of the foreign-born employees was secured.

At the time when the First Liberty Loan was offered to the public, the Pennsylvania lines east of Pittsburgh and Erie had a total of 25,827 employees who had been born in foreign countries. Of this number 8,146 employees, or almost 32 per cent of the total foreign born, purchased Liberty Bonds, and this was within 2 per cent of the proportion of employees of American birth who subscribed. The inquiry also brought out the in-

teresting fact that there were in the service of the Pennsylvania Railroad men of 42 different nationalities besides native-born Americans, and that members of 30 alien races were included among the buyers of Liberty Bonds of the first loan.

The good showing made by employees of alien birth in Liberty Loan subscriptions may doubtless be confidently accepted as evidence of true love for America, no less than as a proof of a high degree of thrift on the part of the foreign born. The latter characteristic, moreover, is further emphasized by the figures for the Pennsylvania Railroad Employees' Saving Fund. This fund at the present time has about 9,700 depositors, and of this number approximately one-third are employees of foreign birth.

As early as 1904 the Pennsylvania Railroad, with the idea of encouraging thrift among its foreign-born employees, opened a campaign to increase its saving fund depositors, and as a result a great many Italian and Irish employees opened accounts in the company's saving fund and large numbers of them are depositors to-day. To assist in this work a special pamphlet of information was issued in both English and Italian.

To ascertain the proportion of foreign-born employees who had been naturalized, or were in process of becoming citizens, a special analysis was made as of June 30 last. At that time there were in the service of the Pennsylvania lines east of Pittsburgh 25,721 men of alien birth. Of this number it was found that 8,003 had been fully naturalized, 3,069 had taken out their first papers and 5,064 had definitely announced their intention of applying for naturalization.

On the lines west, out of a total number of 7,500 employees of alien birth, about 1,900 are naturalized, 1,700 have taken first steps toward naturalization and 1,300 have definitely announced their intention of applying for citizenship.

CONSERVING LABOR IN TIE RENEWALS

By Assistant Supervisor

IN VIEW OF THE SHORTAGE of both labor and material as applied to track work, every roadmaster or supervisor is facing the problem of getting the greatest possible service out of every facility at his command. Among other things, careful scrutiny is being made of the ties coming out of track and any tie that will last another year is given the opportunity to do its bit by allowing it to remain in track, even at the expense of spotting in a new tie in its place one year hence. In order, however, to conserve our labor as well as our ties, every man should decide on the ground what is the most economical method to use in his renewals.

If the number of ties to be renewed runs high it is economical, unless prevented by girder bridges or overhead clearances, to give the track a raise of two or three inches before starting the renewals. Aside from the benefits to be gained in this raise, such as the improved riding qualities of the track and better drainage there is a material saving in labor when the ties are renewed, which more than offsets the labor expended in the raise. The following comparison of the unit costs of renewing ties without raising track and including raising is based on actual observations of what is being done by the average gang, at an hourly rate of 25 cts.:

Where the track was not raised the average performance was 0.7 tie per labor hour and the cost of renewals $0.36 per tie. This includes handling the ballast in the adjoining crib and proper tamping at the time of renewals. After the tie has been in the track from two days to a week a second surfacing is necessary, owing to the tie settling under traffic. This has been found to run 25 min. per tie, or a cost of $0.10 per tie, making a total cost of $0.46 per tie.

Where the track is raised, the average performance in raising track is 12 ft. of track per labor hour, or a cost of 2.08 cts. per foot. The average performance in renewals after the raise is 55 min. per tie, or a cost per tie of $0.23. The track should be given a running surface at the time of renewals, but the final surface should not be made until the traffic has had an opportunity to settle those places that are subject to settlement. About a week after renewals, the track which has been raised should be given a final surface. The average time on this surfacing has been found to run 10 min. per tie, covering all ties in track, or a cost of two cents per foot of track. The total cost per tie, then, including raising track, renewals, and final surfacing will depend upon the number of ties renewed, and the cost per tie, "C," of renewing "N" ties per 33 ft. of track, including raising and final surfacing, will be shown by the expression

$$C = \frac{2.08 \times 33 + 23 \times N + 2 \times 33}{N} = \frac{134.6 + 23 \times N}{N}$$

The values of C for various values of N in this expression are as follows:

N = 1	C = $1.57	N = 6	C = $0.45
N = 2	C = .90	N = 7	C = .42
N = 3	C = .68	N = 8	C = .40
N = 4	C = .56	N = 9	C = .38
N = 5	C = .50	N = 10	C = .36
		N = 18	C = .30

As the above-mentioned cost of $0.46 per tie for installing ties when the track is not raised lies between the $0.45 and the $0.50 in the above table, it is shown that it is economical to raise the track before renewing ties if the number of ties to be renewed exceeds five per rail length. The cost of the new ballast or the labor necessary to apply it after the ties have been renewed has not been considered in the above comparison, as this should be considered as an improvement rather than an expense.

The question of whether to use a two-man or a three-man tie gang is one which involves a study of the men in the gang. In exceptional cases, where the men are well trained and skilled in their work, the writer has seen gangs of two men each renewing ties at the rate of 1½ ties per labor hour. These men utilized every opportunity to make time. For example, a raising bar was placed under the end of the tie and one man with one foot on the bar would hold the tie up to the rail and tamp the tie at the same time. Also the tie-plate was applied after the tie was tamped by raising the rail slightly and slipping the plate into place; in this way the value of the thickness of the tie-plate was added automatically to the amount of tamping done. In the case of the average workman a three-man gang will work to better advantage, especially if the tie must be dragged over one or more tracks to the point of installation. Two men can carry out the old tie and pull in the new tie while the third man is preparing the bed. While two men are placing the tie-plate after tamping the tie, the third man can start spiking, and by tamping the tie before the spiking is done, the tie will stay up to the rail while being spiked without being held up with a bar.

In the work of trucking ties it has been found economical to use a two-wheel "track-dolly" for trucking ties up to a distance of 200 ft. Beyond this distance a four-wheel truck should be used.

ACTIVITIES OF THE RAILROAD ADMINISTRATION

Abstracts of the Orders Issued by the Director-General and the Regional Directors. Labor Regulations Outlined

DIRECTOR GENERAL McADOO has announced the appointments of four new regional directors during the past month. N. D. Maher, president of the Norfolk & Western, was appointed regional director of the new Pocahontas Regional District, with office at Roanoke, Va., and with supervision over the coal carrying roads extending from West Virginia to terminals at Hampton Roads. B. L. Winchell, director of traffic of the Union Pacific System, was appointed regional director of the Southern district, with office at Atlanta, Ga., succeeding C. H. Markham, formerly president of the Illinois Central, who was appointed regional director of the new Allegheny region, with office in Philadelphia and in charge of roads between the Pittsburgh district and the Atlantic seaboard. The Western district has been divided into the three areas. R. H. Aishton, regional director, has been given charge of the North Western Regional District with headquarters in Chicago, and with supervision over those roads between Chicago and the North Pacific coast. Hale Holden, president of the Chicago, Burlington & Quincy, has been appointed regional director of the Central Western Regional District, with office at Chicago, and with jurisdiction over lines between that point and the Pacific Coast. B. F. Bush, president of the Missouri Pacific, has been appointed regional director in the South Western Regional District, with office in St. Louis, and with supervision over roads in the southwest.

The Eastern Regional District has been subdivided and James H. Hustis, president of the Boston & Maine, has been appointed district director in charge of the New England roads, with headquarters at Boston. H. A. Worcester, vice-president and general manager of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed district director in charge of the roads in the Ohio-Indiana district, with headquarters at Cincinnati, Ohio. Both Mr. Hustis and Mr. Worcester report to A. H. Smith, regional director of the Eastern Regional District.

The Director General has announced that a federal manager will be appointed for each railway property, who will be in charge of its operation, and report solely to the Railroad Administration. Where the presidents were formerly operating officers they are being selected as federal managers in many instances. In other cases operating vice-presidents or general managers have been chosen. The appointment of federal managers as exclusive representatives of the government in charge of operation removes the corporate officers from any jurisdiction over operating matters. In some instances general managers have been appointed on the smaller lines, the understanding being that a federal manager will be appointed over two or more general managers later.

Miscellaneous Orders

Under date of May 29 the Western Regional Director asked that the roads advise him by telegraph of their requirements for steam shovels, locomotive cranes, electric traveling cranes and gantry cranes for the remainder of the year and not under order.

In a letter to western railroads dated June 7, R. H. Aishton, regional director, calls attention to the fact that the engineer corps of the war department is in the most urgent need of a large number of high grade transits with full vertical circle erect image and complete with tripods similar to C. L. Berger & Son No. 4½ mountain and mining transit, Buff Mfg. Co. No. 3 C transit and W. and L. E. Gurley's No. 27 A transit. As the manufacturers are unable to furnish these instruments, it is necessary to secure them from other sources and the roads are asked to report in detail the number and quality of instruments that can be spared, together with a statement of their physical condition and their price.

The Western Regional Director has called the attention of the roads in that area to the fact that they may contract for and start work in excess of $25,000 in advance of the approval of D. C. E. Form No. 4, provided the work is included in the budget which was approved by the Director General or the Director of the Division of Capital Expenditures, excepting those budgets which were conditionally approved. It is possible, however, that under certain conditions work authorized in the approved budget may be stopped and in all contracts provision should be made by the carrier for such a contingency. Attention is also called to the fact that D. C. E. Form No. 3, which covers work costing less than $25,000 and more than $5,000, should be submitted at the time it is decided to proceed with the work covered thereby, and that it is not necessary to wait until the work has been actually commenced.

Purchasing Committee Orders

The Western Regional Purchasing Committee has issued Circular No. R. P. C. 11, authorizing the roads to make contracts for materials and supplies when it is advantageous to do so, but stating that contracts must not be made for a longer period than one year nor to contain a clause permitting them to run until notice of cancelation. If it is believed that a contract should run longer than one year, the matter should be taken up with the Regional Director for approval.

Under date of May 25, the Western Regional Purchasing Committee sent a letter to the roads in this territory asking that they advise the lists of points at which they are carrying on scrap reclamation work and the facilities which they have at those points; the character of materials which they are reclaiming, the extent to which additional facilities are desired and the equipment which they have in the maintenance of way department for repairing frogs, crossings, switch points, etc. The letter closes with a statement that "It is desirable that the fullest advantage be taken of all existing facilities for this kind of work. Those in charge of such work should confer with other lines in their locality, with a view of making such recommendations as are desirable."

Contracts Involving Labor and Material

The Western Regional Purchasing Committee has sent out Circular No. R. P. C. 12 relative to the awarding of contracts involving labor and material as follows:

> Apparently there is some misunderstanding as to the meaning of that paragraph in Regional Director's Circular No. 54, of March 25, 1918, which reads as follows:
>
> "It should be understood that authority to do work does not carry with it authority to purchase material; if the material is not in stock the department doing the work should procure it on approved requisition through the purchasing department."

The misunderstanding seems to exist in those cases where departments other than the purchasing department make contracts for the erection of buildings, etc., which include both labor and material.

In such cases the following should apply: Competitive bids should be obtained from contractors. The bid should include an itemized list of equipment and material to be furnished, specifying grades of lumber, specifications for brick, etc., with unit prices and the f. o. b. point at which they apply, with the understanding that the railroad company may furnish any or all of the items as it sees fit, and the bid be reduced accordingly.

These propositions should be submitted to the purchasing department and prices carefully checked by it to ascertain that they are not higher than Government prices, on such material as prices have been fixed, and that prices quoted on other materials correspond with prices the railroad company is paying for similar grades. If the purchasing department can furnish some of the material more advantageously, the Engineering or other departments should make requisition for such material and the purchasing department should handle it. The desire is to obtain material at the lowest possible prices and to see that *no higher than Government prices are paid* where such prices have been fixed. The fullest co-operation should be had between the engineering or other departments and the purchasing department in respect to the handling of such contracts so that no delay will ensue.

THE APPROVED BUDGET

The Railroad Administration has announced the classification of the budgets of capital expenditures for all railroad and terminal companies for 1918, as approved by the Division of Capital Expenditures, with some additions to the list previously announced, bringing the total up to $946,293,000.

Class of Work.	Capital Expenditures.
Widening cuts and fills, filling trestles, etc.	$ 4,969,818
Ballasting	9,524,589
Rails and other track material	31,556,115
Bridges, trestles and culverts	38,035,762
Tunnel and subway improvements	2,195,242
Track elevations or depressions	6,691,178
Elimination of grade crossings	7,784,782
Grade crossings and crossing signals	640,291
Additional main tracks	47,471,002
Additional yard tracks, sidings and industry tracks	98,661,553
Changes of grade or alinement	6,363,527
Signals and interlocking plants	11,147,726
Telegraph and telephone lines	5,031,297
Roadway machinery and tools	954,869
Section houses and other roadway buildings	1,510,546
Fences and snowsheds, right-of-way, snow or sand fences	817,641
Freight and passenger stations, office buildings, etc.	22,940,636
Hotels and restaurants	199,282
Fuel stations and appurtenances	6,164,839
Water stations and appurtenances	13,447,816
Shop buildings, enginehouses and appurtenances	61,979,476
Shop machinery and tools	10,544,138
Electric power plants, sub-stations, transmission lines etc.	10,771,256
Wharves and docks	3,236,167
Coal and ore wharves	7,024,937
Grain elevators and storage warehouses	2,954,202
Real estate	3,357,070
Assessments for public improvements	1,171,490
All other improvements	28,491,978
Total (Excluding Equipment)	$445,639,225
Locomotives	$199,075,420
Freight-train cars	206,994,914
Passenger-train cars	28,340,446
All other equipment	12,963,109
Improvements to existing equipment	35,043,290
Total equipment	$482,417,179
Construction of extensions, branches and other new lines	$ 18,237,424
Total, all expenditures	$946,293,828

CENTRAL LUMBER PURCHASES

The Central Advisory Purchasing Committee has issued a statement to the effect that the government has arranged a bureau for the handling of yellow pine lumber, prices and the allocation of orders. The railways are instructed to send out their bid requests as at present and to place such lumber orders as they can directly as heretofore at not above government prices, with the exception that in cases of extreme emergency or on account of fire, accident or other trouble which must be overcome at once, the roads will obtain the necessary lumber at the best price possible from the quickest sources of supply. Such lumber as the roads cannot locate directly on their regular bid requests should be referred through the Regional Purchasing Committee to the Central Advisory Committee, which will endeavor to place the order with as little delay as possible through the Director of Lumber. The Central Advisory Purchasing Committee also offers it co-operation in securing prompt delivery on old orders, which are still unfilled. The roads are asked to advise specifically if any bridges are badly in need of repairs in order that delivery may be insisted upon.

SCRAP PRICES

The following circular, known as Supplement No. 1 to Circular No. R. P. C. 13, has been issued to the western roads under date of June 14:

To clear up misunderstandings in connection with the third paragraph of Circular No. R. P. C. 13, regarding scrap rail, the following will be observed:

The present maximum price for scrap steel rail, sold for re-rolling purposes, is $34 per gross ton, delivered consumer's works. This classification includes scrap steel rail, five feet and over, standard sections, 50 lbs. and heavier, free from frog, switch and guard rail. This may include pieces of switch points five feet and over, 50 lbs. and heavier, which may be cut off so that no part of the taper is included, or other similar pieces, five feet and over in length. At the difference in price between other scrap rail and rail for re-rolling, which is $5 per gross ton, it may pay roads to more carefully sort scrap rail in this respect and cut off the tapering portions of switch points.

Other scrap rail should not be sold at to exceed $29 per gross ton, delivered at consumer's works, except rail sheared to short lengths for use in cupolas or hand charging furnaces, in which case it may be sold at not to exceed $34 per gross ton, delivered at consumer's works. Crop ends from re-sawed rail would come under the short length class at $34 a gross ton.

COST OF SECOND HAND RAIL TO INDUSTRIES

R. H. Aishton, western regional director, has sent the following circular, known as Supplement No. 1 to Circular No. 56, to the western roads:

In order that there may be no misunderstanding in negotiating with necessary industries, in accordance with General Order No. 15, issued by the Director-General on March 26, 1918, which specifies the terms for construction of industry tracks, the price for second hand relay rail, until further notice, shall be from $55 to $65 per gross ton, depending upon quality and location f. o. b. carrier's tracks nearest to delivery point. In general, the price per gross ton for good quality second hand rail for sidings and spur tracks should be $60 east, and $65 west of the Rocky Mountains, except that light inferior rail may be sold for $55 to $60 per gross ton. It is desired that authority be requested from this office in each instance for furnishing rail, giving the name and address of the purchaser, pattern weight, quality, price and the use to be made of the rail. These requests will be handled promptly by this office.

THE CONSERVATION OF MATERIALS

The Southern Regional Director has sent out an urgent appeal for the conservation of materials and supplies. Among the suggestions which he makes are the following of interest to maintenance of way men:

Fish plates and angle bars, if bent, to be straightened and put back in stock if there is rail of the size in use.

Bent spikes should be annealed in a wood fire, and when cold, straightened by hand.

Track bolts are to be annealed, straightened when necessary and rethreaded.

Worn frogs can in many cases be repaired by building up worn parts by oxy-acetylene. Where the wear is too great, the removal of the worn part will prove economical.

Worn switch points, if of sufficient length may be planed to

the next shorter size switch, or in other cases repaired by the use of economy points.

Main line rail which has had the head battered down on account of low joints, may be built up in the track after the joint has been set up, by oxy-acetylene.

All track tools should be carefully inspected, and unless worn out entirely, repaired and put in stock.

Tie plates should be carefully sorted out and straightened, and if suitable for rail in use, put in stock.

At the close of each day, section forces should gather up all loose track materials scattered about in making repairs to tracks, renewals or new construction.

Angle bars and bolts on rails taken from track should not be removed from the rails, but should be left attached to them and shipped with them.

Track walkers should be required to pick up and pile in a convenient place all light materials, which drop or fall from trains, and must notify section foreman of the location of heavy parts which they are unable to move and which they may find on the right of way.

In view of the extreme shortage of all forms of iron and steel and the requirements for this class of materials, special attention should be given to the utilization of any such materials that may be found in dismantled light weight steel bridges, turn tables and similar structures that are carried in stock on the various railroads. The question of utilizing all such material to the very best advantage is a serious one, and it will be found that much valuable material for many purposes may be obtained from dismantling such structures and utilizing the component parts.

PORTLAND CEMENT REGULATIONS

The War Industries Board has advised the Central Advisory Purchasing Committee of the tentative procedure to be followed in the purchase of cement for railroads:

"Probably by June 15, the War Industries Board will have put into effect an order directed to all manufacturers of Portland cement, which will prevent the manufacturers accepting Government orders or making shipments which have not been approved by the Portland Cement Committee. The chairman of the committee is regarding the railroad requirements as Government requirements and will allocate the railroad requirements in line with the procedure on direct Government contracts.

"A good deal of the Government work is executed through contractors. If the cost of the cement is submitted as a separate item, the Committee fixes the price. If the contract is a lump sum, the committee requires the contractor to give the Government the benefit of the difference between the market price on which he may have figured and the Government price, assuming, of course, that the market price is higher than the Government price. This makes it necessary for the railroad to certify that the amount of cement specified is to be used for railroad purposes and that any difference in price will accrue to the railroad and not to the contractor.

"The contractor, if he is the actual purchaser of the cement, must make application to the Portland Cement Committee on such Government railroad requirements and a copy of the request for cement with the certificate, furnished by the proper railroad authority. Thereupon the Portland Cement Committee will indicate where he shall make the purchase and will authorize the mill to ship."

SUP. 1 TO R. P. C. NO. 2—NOTICE FROM WAR INDUSTRIES BOARD GIVING PRICES FIXED ON CEMENT FOR FOUR-MONTH PERIOD ENDING AUGUST 31, 1918.

Washington, May 6, 1918.

At a meeting of the Price Fixing Committee on Saturday, May 4, the War Industries Board fixed the following prices for Portland cement for the four months ending August 31, 1918:

Hudson, N. Y.	$1.85	Houston, Tex.	$1.80
Northampton, Pa.	1.75	El Paso, Tex.	1.95
Universal, Pa.	1.75	San Antonio, Tex.	1.95
Fordwick, Va.	1.70	Trident, Mont.	1.90
Bellevue, Mich.	1.80	Portland, Colo.	1.75
Mitchell, Ind.	1.70	Devils Slide, Utah	1.90
Hannibal, Mo.	1.70	Brigham, Utah	1.90
Buffington, Ind.	1.60	Salt Lake City, Utah	1.90
La Salle, Ill.	1.70	Irvin, Wash.	1.95
Mason City, Ia.	1.70	Concrete, Wash.	1.95
Iola, Kan.	1.75	Oswego, Ore.	2.00
Steelton, Minn.	1.70	Cement, Cal.	1.95
Kingsport, Tenn.	1.65	Davenport, Cal.	1.95
Richards City, Tenn.	1.65	Crestmore, Cal.	1.95
Harrys, Tex.	1.70		

Shipments in bulk 15 cents per barrel less.
Shipments in paper bags 10 cents per barrel additional.
Shipments in cloth bags 40 cents per barrel additional.

Cement companies will issue credit to the department or contractor to whom the cement has been sold or shipped in cloth bags, at the rate of 10 cents each for the company's empty cloth bags bearing its brand, upon receipt in serviceable condition at its mill, freight prepaid, subject to the company's inspection and count; such bags to be returned within 60 days from date of receipt of shipment. Cloth bags are the property of the cement companies and are not to be used by the government departments or their contractors for other purposes, and while in their possession are to be properly cared for and special attention given to their prompt return to the shipping mill.

On the above basis, with freight added, prices will be named f. o. b. cars at destination based upon present rates of freight and war tax on this freight, subject to increase in destination prices in accordance with any increases which may be made in freight rates and the war tax on same. Shipments to be made freight collect, deducting from invoice and amount of the freight from mill to destination. In special and exceptional instances where shipments are desired freight prepaid, invoices will be rendered at destination prices without freight deduction.

Terms of payment will be 30 days net cash or five cents per barrel discount if invoices are remitted for within 10 days from date of shipment.

Attached are the conditions under which the purchases of Portland cement are to be made by the several departments of the Government at the above named prices for the four-month period beginning May 1st, 1918.

1. All cement must meet the requirements of the United States Government Specifications for Portland cement.
2. The cement will be generally shipped on 7-day test unless specifically waived, but this does not waive the full requirements of the specifications, including the 28-day tests, and any waiver will be handled direct by the department concerned.
3. All shipments must be from 7-day accepted cement unless otherwise provided, but no cement shall be shipped that has not passed the tests for fineness, soundness and time of setting.
4. At the discretion of the purchasing officer, any company whose cement has failed to meet the Government tests may be denied further orders.
5. The minimum shipment shall be one carload.
6. Three bills of lading will be required.
7. Where freight is required to be prepaid, it shall be consigned to the United States Government officer in charge, or a certificate must be obtained from the purchasing officer certifying that the shipment is intended for Government work. By complying with this procedure no war tax will have to be paid.
8. To secure the Government price, orders must be either placed directly by the Government officer or the order must be certified as for Government use by the department concerned, stating that the saving in the Government price over the commercial price will accrue to the benefit of the Government.
9. All orders must bear the requisition number, contract number, number of barrels required, when required, rate of shipment, definite shipping point, name of puchaser and to whom consigned and name of contractor.
10. The alloted time for the return of cement sacks shall be 60 days from the date of delivery of the shipment.
11. Unless otherwise directed, the cement shall be billed direct to the Government officer in charge.
12. All orders for cement to be purchased at Government price must be placed through the Portland Cement Committee on Government Requirements.

A LABOR SURVEY

The directors of the Western Regional Districts have sent the following inquiry regarding labor to the roads in their areas:

For the information of the Board of Railroad Wages and Working Conditions, will you kindly furnish the following data relative to maintenance of way labor conditions covering your line:

1. What is your normal summer force of common labor?
   - (A) Section labor.
   - (B) Extra track maintenance gang.
   - (C) Track contsruction gangs.
   - (D) Bridge department.
   - (E) Building department.
   - (F) Water supply and fuel department.
   - (G) Signal department.
   - (H) Other branches of service (specifying.)

2. What total forces in each of the above should you have quickly to anable you to get the property in normal shape for present or winter service?

3. What rates do you recommend be paid to obtain adequate supply of common labor?

4. What minimum differential expressed in per cent over usual monthly earnings of common labor should be paid foreman?

LABOR AGENCIES

The Western Regional Director issued Supplement No. 4 to Circular No. 63 on Labor Agencies on June 11, as follows:

In order to co-ordinate the work of the Government and private labor agencies in obtaining track labor, it has been found advisable for the U. S. Employment Service to bring under its jurisdiction the various private labor agencies securing track labor at the following points:

Chicago, Ill.,	Kansas City, Kans.
Kansas City, Mo.,	Superior, Wis.,
St. Louis, Mo.,	St. Paul, Minn.,
Minneapolis, Minn.,	Omaha, Nebr.,
Duluth, Minn.	Sioux City, Iowa.

This arrangement is to be operated under the following plan:

1st. Any railroad desiring track labor will file its orders with the Government agency direct, or with branches of the Government agency (which are the former private agencies).

2nd. Orders for track labor to include the following information:

"Fifty extra gang laborers are desired for ———— (Station); rate of pay 27 cents per hour (or whatever is to be paid in that particular territory)," or, "Forty Greeks, Italians, or any other class of laborers, are desired for ballast gang placing stone or gravel ballast (as the case may be) to be located at ———— (Station)."

3rd. The order should specify whether for extra gang or section work and the class of work they are to perform, and if boarded by the company, the amount per week to be deducted for board.

4th. It is understood that railroads will continue their present organizations for securing track labor. Locally along their line they will gather up labor as in the past from what is commonly known as "native labor."

5th. In the cities or large centers where railroads have regular labor agencies, these agencies will continue to procure labor as in the past, but such labor agencies of the railroad companies will be deputized and to that extent become federal agencies.

6th. It should be understood that these labor agencies of the railroads will not offer rates of pay, working conditions or boarding conditions different than those offered through the U. S. employment service, and that no fees shall be accepted or paid by any agent in securing track labor. Orders for track laborers will not be placed with any agency accepting employment fees *at points enumerated.*

7th. Where a railroad has its own labor agencies, it is desired that the order shall be placed with the U. S. employment service at the same time as it is placed with and through its own agencies, so that the federal agencies may have an equal opportunity to secure the men.

HIRING TRACK LABORERS

The following order fixing wages and working conditions of track laborers on the western roads was issued as Supplement No. 5 to Circular No. 63 by the Western Regional Director, under date of June 13:

After a conference on June 11th, at which practically all of the interested roads were represented, it was thought advisable to again outline the instructions contained in Circular No. 63, owing to changes in the rates, etc., as authorized by Director-General's Order No. 27. Therefore, effective June 16th, the following rates and rules will apply for the balance of the season:

1. All railroads will make the fullest use possible of U. S. Government labor agencies. It is not intended that this will prevent any railroad from obtaining labor supply locally in such manner as it has heretofore pursued, but it is desired that, wherever possible to obtain laborers through Government agencies, it should be done.

2. The standard day for all track labor shall be ten hours.

3. The maximum rate for track labor outside of large terminals, important industrial centers and metal mining regions, shall be 27½ cents per hour.

4. Within large terminals, important industrial centers and metal mining regions the maximum rate shall be 30 cents per hour.

5. The minimum rate shall be that fixed by Director-General's Order No. 27, and where the minimum rates fixed by General Order No. 27 are higher than the maximum rates herein covered, the rates named in that order will apply.

6. The increased rate at large terminals is to be confined to switching districts and will apply at the following terminals:

Chicago,	Milwaukee,	Seattle,
Twin Cities,	Tri-Cities,	Peoria,
Duluth,	Omaha,	Kansas City,
Portland,	Tacoma,	Council Bluffs,
Des Moines,	Ogden,	St. Joseph,
St. Louis,	Spokane,	Sioux City,
Superior,	Aberdeen, S. D.,	Salt Lake City.

A list showing additional switching districts at which increased rates will apply will be issued and sent out later.

7. No allowances of any kind will be made for board or for any other reason that will have the effect of increasing compensation.

8. Laborers called for night service after being relieved from duty or performing Sunday inspection will be paid a minimum of five hours.

9. It is essential for good service that clean, sanitary, housing conditions for extra gang or floating labor be provided.

(a) Railroads may provide at laborers' rates one man for every 75 men or less for the proper upkeep of the camps and also for one night watchman.

(b) For each and every gang of 10 men, one cook may be allowed, and for each additional 25 men, one waiter be added.

(c) Railroads may transport free of charge food and essential camp supplies necessary, but this will not include food supplies for other than men employed in the camps and does not include commissary supplies sold to the men.

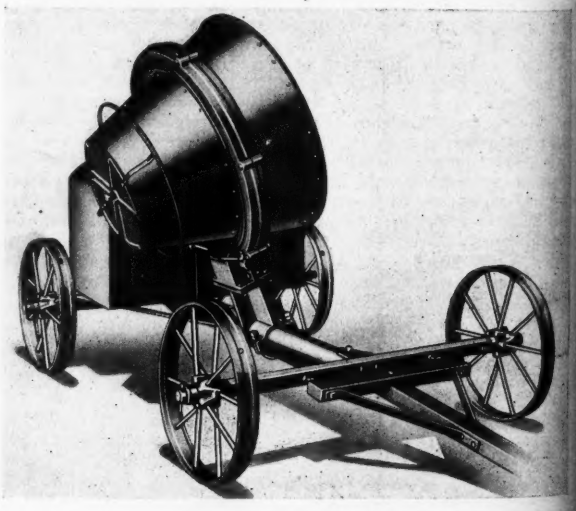
10. Payment of fare for laborers from labor markets to the points needed and their return fare to the point where employed may be continued. Such practice will not be considered as an allowance that will have the effect of increasing compensation.

(a) Reduced passenger rates will not be allowed by intermediate carriers.

(b) The practice of labor agents recruiting laborers from the forces of any other road is prohibited, any violations of this to be reported to this office.

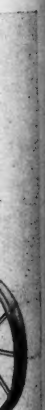
A NEW CONCRETE MIXER

THE ACCOMPANYING PHOTOGRAPH shows the outline of a small mixer of the "tub" type that differs radically in structural makeup from other mixers. The most interesting feature is the support for the drum. The four-wheeled truck is made up of 1½-in. axles with



THE EVEREADY MIXER

24-in. by 3-in. wheels connected by a center sill or reach consisting of a 5-in. extra heavy wrought steel pipe. On this pipe, about midway between the axles, an upright member carries a ring which encloses and supports the mixer drum. The latter is conical in shape and fitted



Organization of the U

HENRY WALTERS, Advisory

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R. Walton Moore, Ass't Gen. Counsel.
Nathan Matthews, Special Counsel.
F. W. Gwathmey, Assistant.
G. W. Eddy and J. B. Wright, Ass'ts.

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Willard Robertson, Assistant.
H. L. Van Sicklen, Attorney.
D. B. Leonard, Attorney.

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G. A. Tomlinson. M. J. Sanders.
Brig. Gen. Charles Keller, Secretary.

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Union Electric Bldg., St. Louis.
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F. J. Henry, Assistant.
G. A. Tomlinson, General Manager.
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Coastwise Steamship Advisory Committee
165 Broadway, New York.
L. J. SPENCE, Chairman.

the United States Railroad Administr

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M. Bruce Claggett, Private Secretary
WALKER D. HINES, Assistant Director General
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L. W. Baldwin, Operating Assistant.
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A. T. Hardin, Asst. Reg. Dir.
F. La Bau, Traffic Assistant.
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Southern Region
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F. F. Gaines. S. S. Roberts.

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Southern Freight Rate Committee
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Southern Export Comm
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Supplement to the
Railway Maintenance Engi
July, 1918

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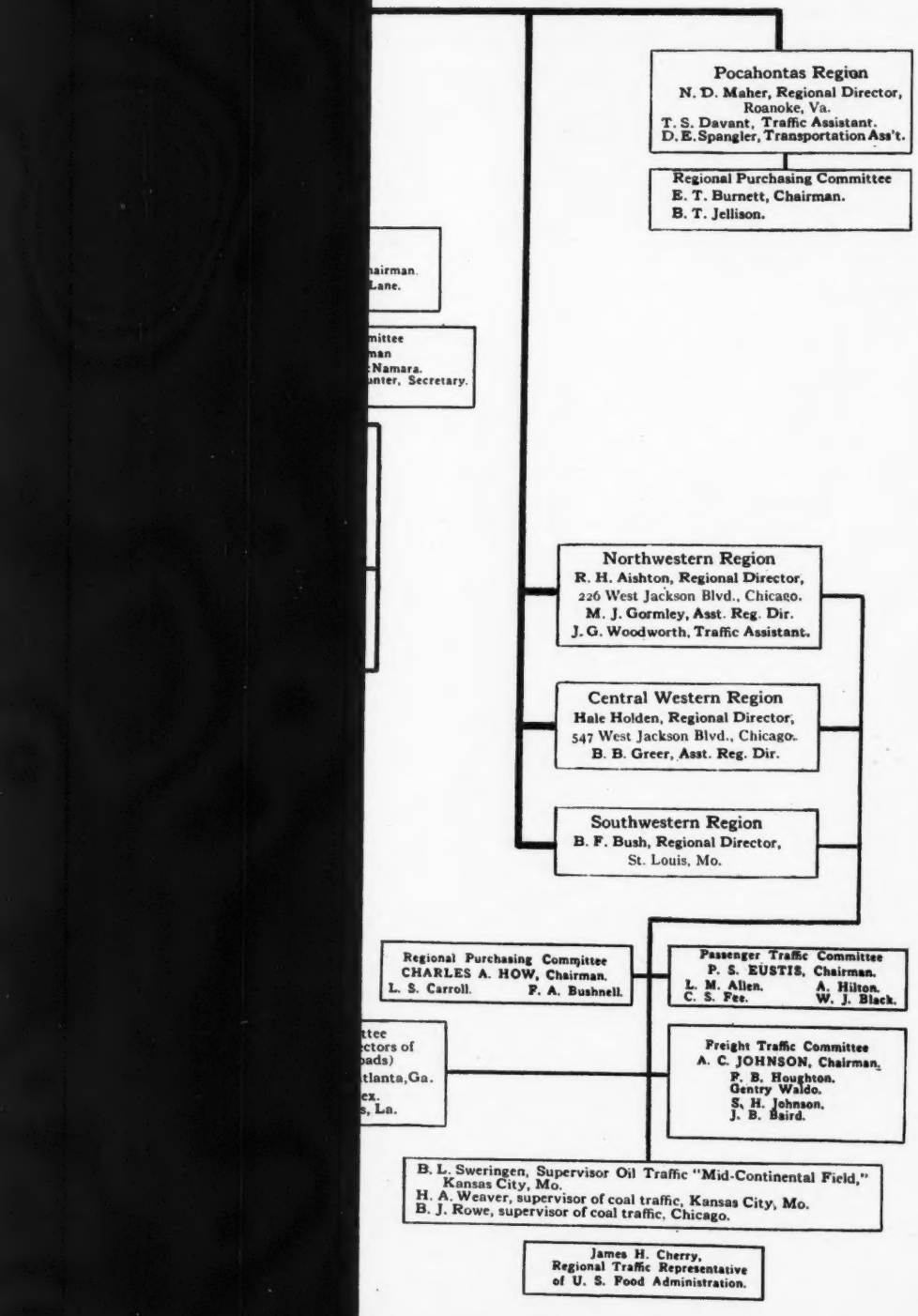


Regional Limits

Eastern Region

All railroads north of the Ohio and Potomac rivers and east of Lake Michigan and the Indiana-Illinois state line; also those railroads in Illinois extending into that state from points east of the Indiana-Illinois line, but excluding those roads included in the Allegheny and Central Western Regional Districts.

Allegheny Region

Pennsylvania Railroad (east of Pittsburgh and Erie).
Baltimore & Ohio (east of Pittsburgh and the Ohio river).
Bessemer & Lake Erie.
Cumberland Valley.
Central Railroad of New Jersey.
Coal & Coke.
Philadelphia & Reading.
Western Maryland.
Cumberland & Pennsylvania.
Pittsburgh & Lake Erie.

Pocahontas Region

Chesapeake & Ohio (east of Louisville, Ky., Columbus and Cincinnati, O., including the Chesapeake & Ohio Northern).
Norfolk & Western.
Virginian.

Southern Region

All railroads south of the Ohio and Potomac rivers and east of the Mississippi river, also those railroads in Illinois and Indiana, extending into those states from points south of the Ohio river and not included in the Pocahontas and Central Western regional districts.

Northwestern Region

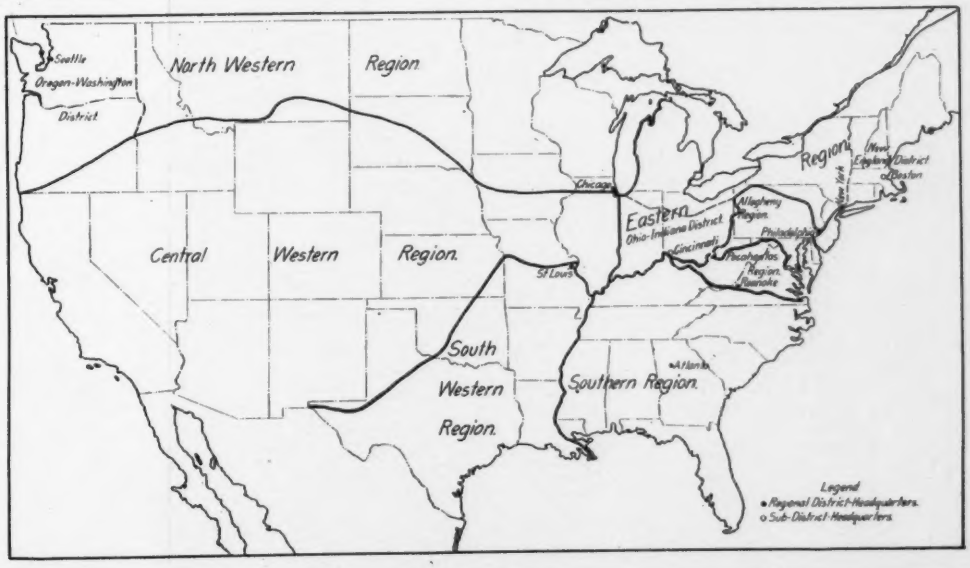
Chicago & Northwestern.
Chicago, St. Paul, Minneapolis & Omaha.
Chicago Great Western.
Chicago, Milwaukee & St. Paul.
Great Northern.
Minneapolis & St. Louis.
Minneapolis, St. Paul & Sault Ste. Marie.
Northern Pacific.
Oregon-Washington Railroad & Navigation.
Southern Pacific Lines (north of Ashland, Ore.).
Spokane, Portland & Seattle.
Spokane International.

Central Western Region

Atchison, Topeka & Santa Fe.
Chicago, Rock Island & Pacific (except from St. Louis to Kansas City; lines east of El Reno; lines El Reno to Memphis and branches, and south of Chickasha).
Chicago, Peoria & St. Louis.
Chicago & Alton.
Chicago & Eastern Illinois.
Chicago, Terre Haute & Southeastern.
Chicago, Burlington & Quincy.
Colorado & Southern.
Denver & Rio Grande.
El Paso & Southwestern.
Illinois Central (north of Cairo and Paducah).
Los Angeles & Salt Lake.
Northwestern Pacific
Oregon Short Line.
Quincy, Omaha & Kansas City.
Southern Pacific Lines (west of El Paso and Ogden, except north of Ashland, Ore.).
St. Joseph & Grand Island.
Union Pacific.
Western Pacific.

Southwestern Region

Fort Worth & Denver City.
Fort Worth & Rio Grande.
Gulf, Colorado & Santa Fe.
Gulf Coast Lines.
Galveston, Harrisburg & San Antonio
Houston & Texas Central.
Houston, East & West Texas.
International & Great Northern.
Kansas City Southern.
Louisiana & Arkansas.
Louisiana Railway & Navigation.
Louisiana Western.
Midland Valley .
Missouri Pacific System.
Missouri, Kansas & Texas.
Morgan's Louisiana & Texas Railroad & Steamship.
Rock Island Lines (south of Chickasha; El Reno to Memphis and branches; and St. Louis to Kansas City).
St. Louis-San Francisco.
St. Louis Southwestern.
San Antonio & Aransas Pass.
Texas & Pacific.
Texas & New Orleans.
Wabash Railroad (St. Louis to Kansas City and Omaha)
Wichita Falls & Northwestern.
Texas Midland.
Wichita Valley.



with a circumferential rib that fits into a corresponding groove on the inside of this ring. The ring is made in two halves bolted together.

This rib and the groove in combination form the bearing on which the drum is rotated. The rib is provided with ball-bearings and its outer edge is fitted with a worm gear that meshes with a worm carried in a horizontal position parallel to the center line of the truck in a bearing at the base of the ring. This worm is direct connected to a 2 h.p. special Fuller & Johnson horizontal, four-cycle, water-cooled gasoline engine placed in a removable housing over the rear axle of the truck. The drum has a 16-in. dia. charging opening and an 18-in. discharge opening, the discharge being equipped with a butterfly or shutter type discharge door. The latter is operated by a circumferential rod passing around the drum near the lower end, which may be grasped at any point while the drum is in motion. The capacity of the drum is 4 cu. ft. of mixed materials, or 6 cu. ft. of unmixed materials per batch, standard rating. Tilting of the drum is unnecessary for discharging, while there are very few working parts and the main bearing is completely inclosed, keeping out dust and dirt. The worm operates in an oil bath. This machine is known as the Eveready mixer and is manufactured by the Oshkosh Manufacturing Company, Oshkosh, Wis.

The Supervisor's Familiarity With Reports*

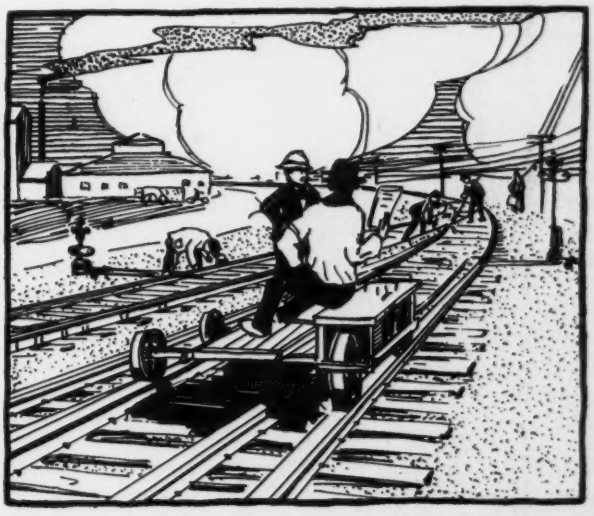
BY J. T. BOWSER,
Maintenance of Way Department, Southern Railway, Danville, Ky.

MAINTENANCE OFFICERS directly in charge of the track and bridge building foremen are known by various titles, and their duties vary considerably on different roads, but for the sake of uniformity they will be referred to here as supervisors of track and supervisors of bridges and buildings. On some railroads the reports made by the foremen go direct to the office of the division maintenance of way officer, and the duties of the supervisors, so far as these reports are concerned, consist simply in seeing that the foremen understand them and make them out promptly and properly. However, on other roads, the supervisor has one or more clerks, and the foremen's reports come to his office for checking and compilation before they are forwarded to the division office or to the accounting department. In either case it is very necessary that the supervisor understand the reasons for these reports and how they should be made out.

To this end it is important, unless he already has a very clear working knowledge of the reports, that the supervisor make a careful study of each report, and that he go back of the reports themselves and see the end which they serve, and the place they occupy in the machinery of operation. This is particularly true of the reports affecting the accounts, as these are not only the most complicated but are among the most important. On nearly every road the accounting department has issued one or more booklets explaining the classification of accounts. If possible the supervisor should secure copies of these booklets and master the theory or general outline of the accounting system. This will be done very easily, as the instructions are usually very comprehensive and the accounting officers will be more than glad to explain any points which are not clear. It must not be understood that the writer thinks, or even suggests, that field men should master all the details of the accounting system, or attempt to memorize the classifications, for that requires an expert. But a clear understanding of the theory will make it very much easier for the supervisor to explain to his foremen the reports on which the accounts are based, and to clear up any difficulty quickly in the classification of the labor and material expenditures.

A clear understanding of these matters will enable the supervisor not only to insure correct reports coming from his district, but will be one step toward promotion, for division officers should, and generally do, have as clear an understanding of the office work as do the office men themselves, as far as the general principles are concerned, though the handling of the larger part of it is, and properly should be, left to the office men.

If the supervisor has one or more clerks and the figures from the foremen's reports are checked or compiled in his office, the necessity for a clear understanding of the office work is even greater than in the other case. The disposition of the average supervisor is to consider himself entirely a field man, and to leave his office work entirely to the clerks. It is true that the primary duties of the supervisor lie in the field, and he should by no means attempt to handle the details of the office work if he has a clerk, but if he is to supervise the work in his office intelligently, he *must know* what it is about, and must be thoroughly familiar with the underlying principles. Otherwise he is simply an animated rubber stamp when he signs his name to the reports, and the railroad loses the advantage of having the reports supervised by a field man who is perhaps the only one in a position to know whether the information on which they



THE AVERAGE SUPERVISOR CONSIDERS HIMSELF ENTIRELY A FIELD MAN

*This is the seventh and final article in the series on Maintenance of Way Accounting. Previous articles have appeared in the December, 1917, issue, page 381; the January, 1918, issue, page 18; the March issue, page 105; the April issue, page 135; the May issue, page 169, and the June issue, page 201.

are based is correct, and if they will serve the purpose.

After obtaining a clear understanding of the whys and hows of the reports, the next duty of the supervisor is to see that as much of this information as may be of use to the foremen is transmitted to them. He should examine their books and records, not only after they reach his office or the division office, but in the field as well. He should correct any irregular practice noted at once and explain why his is the correct way. He should insist that the foremen's records be posted daily, and should see that the foremen realize the importance of this. These records must not be left to the foremen's memory to be guessed at at the end of the month.

So much for the reports which are made by the supervisor from the foremen's reports, or which he sees that the foremen make correctly to the division office. The balance of the clerical work required is composed of reports made from information obtained by the supervisor's reports of his various activities and correspondence. Of the correspondence little may be said in addition to what was outlined in the last issue of the *Railway Maintenance Engineer,* except to emphasize the saving in time which will result from prompt, clear and full replies to all correspondence.

The reports which are classed as strictly supervisor's reports are those made from his own investigations, or reports of his own activities, and may be considered under two heads: (1) those which furnish information for accounting purposes or records, other than those made from or based on the reports of foremen, and (2) those which are designed to guarantee periodical inspection of track, structures or other facilities, or to show that certain duties are performed. The reports of the first class vary so widely with the system of organization in effect on the different roads that they will not be discussed in detail in this article. All that may be said of them is that a clear understanding of the reasons for which they are required, and the ends which they serve, is necessary if they are to be prepared correctly and intelligently.

As has been stated, the second class is designed to insure thorough periodical inspection of the property in charge of the supervisor, and to show that certain specified duties have been performed. A study of these reports will show that, if all the information called for is given correctly, that is if the information is secured from actual examination of the property which is the subject of the report, the features affecting the safe and economical maintenance of the property are entirely covered, and it would be difficult for an unsafe or uneconomical condition to escape notice. If these reports are to serve the ends for which they are designed, they must be based on notes made from actual inspection and must show actual conditions. They should, under no circumstances, be made from memory or merely to show conditions as they should be. If this is done they are not only of no value, since this does not require the close inspection that they are designed to require, but if an unsafe or improper condition is found which is not mentioned in the report, a reflection is cast either on the efficiency and ability of the supervisor, or on his honesty and veracity. It is much better to report the inspection not made and to give the reasons for this than to make a dummy report.

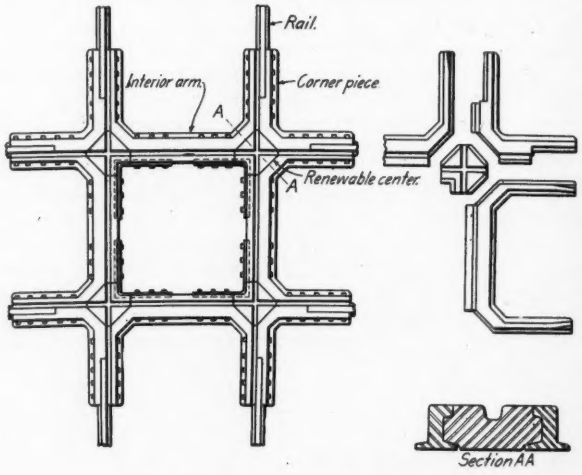
These reports, as well as those designed to show that certain specified duties have been performed, are also safeguards against forgetting to make or postponing inspections, or against failure to fulfil duties which are considered necessary for the safe and economical maintenance of the property. While they *do* serve as a spur to the supervisor who is inclined to neglect his duties, they should by no means be taken as a reflection on the industry or the efficiency of the conscientious man, but should be made out all the more painstakingly by him as a guarantee against any oversight on his part.

A NEW FORM OF CROSSING

A NEW TYPE OF CROSSING has recently been placed on the market which is designed to overcome one cause for the renewal of crossings, namely, the wear of the rail treads at the intersections of the flange ways. This new design provides renewable centers or blocks which include within their limits the tread, flange ways and guard rails of the two tracks at the intersections where the wear is most severe, these blocks or center pieces being securely held in place in the body of the crossing construction, while permitting of their ready renewal when occasion demands.

This crossing was developed by the Balkwill Manganese Crossing Company, Cleveland, Ohio, owners of the patents for the Balkwill articulated crossing, which was described in the *Railway Maintenance Engineer* for December, 1917, page 385. The new design has been adapted to the articulated crossing idea so as to retain the feature of the articulated crossing while introducing the renewable center.

As shown in the drawing, the crossing is made up of separately cast members provided with grooves and projections on the adjoining faces, so that the several parts fit into each other to form a complete crossing. There



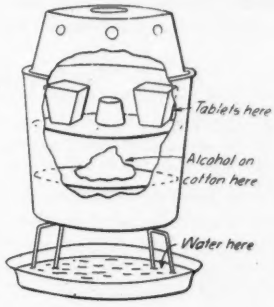
THE RENEWABLE CENTER CROSSING

are four U-shaped side pieces or interior arms, each forming the tread, flange way and guard rail of one of the four sides of the crossing, as well as the guard portion of the two exterior arms. In addition there are four corner pieces forming the tread portions of the exterior arms as in the simple articulated crossing, but in the new design the several pieces are chamfered at each corner to make room for the corner unit. The sides of this corner unit are also provided with tenons which engage corresponding grooves in the adjoining members so that the block is secured in position without the direct assistance of bolts other than those holding the other members together. As a consequence this arrangement has all the advantages of the articulated construction which eliminates the possibility of fracture in the crossing under the deformations taking place with

passing loads, while introducing a relatively small casting which takes most of the wear and may be renewed whenever the wear becomes excessive.

FACILITIES FOR CAMP SANITATION

THE OPERATION of boarding camps or camp buildings for maintenance of way gangs frequently forces the man in charge to combat the vermin problem. It is true that when all persons occupying a camp obey accepted rules of cleanliness no difficulties of this kind are encountered, but labor camps harbor men of various standards of personal habits, making it difficult to eliminate practices which tend to encourage the propagation of these pests. Even where gangs have been thoroughly trained in body cleanliness they are subjected to



THE JUNIOR INSECTOR

the entrance of the newcomer who may bring all kinds of vermin with him.

The problem has two aspects: the maintenance of the camp in a manner that will drive out or kill any vermin brought into it and an effective means of destroying all insects in a camp that has become infested with them. The first condition is being overcome effectively on a number of railroads by the use of a disinfectant or cleanser known as Coro-noleum manufactured by the West Disinfecting Company, New York. This is put into the water used in scrubbing the floors, walls and woodwork of the building interiors. Coro-noleum is a coal tar product in liquid form which has germicidal properties six times stronger than carbolic acid. It is commonly used in the proportions of one tablespoonful to a gallon of scrubbing water and forms suds in the water, thus replacing soap. In addition to destroying disease germs, it is an insecticide and its use discourages vermin. Having been used extensively by railroads in station buildings, toilet rooms and passenger cars, its use has been recently extended to bunk cars and tents. It is said that if it is applied regularly in conjunction with the exercise of ordinary sanitary practices, camp buildings may readily be kept free of vermin.

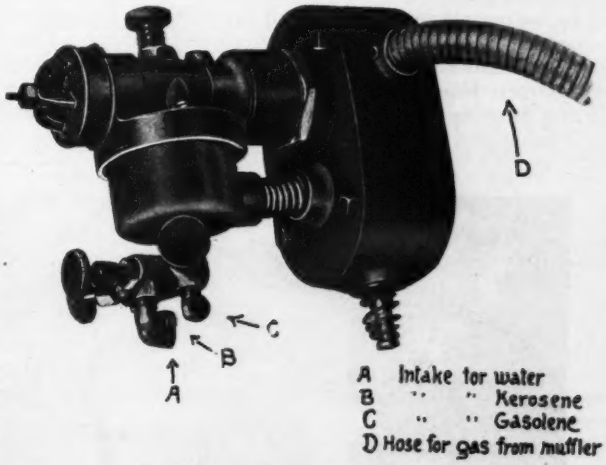
Conditions arise from time to time in the management of camps when more heroic methods are required. In other words, a camp becomes so thoroughly infested with vermin that it is necessary to kill them by fumigation, such as is occasionally accomplished by burning sulphur. The West Disinfecting Company has perfected equipment and material for doing fumigating which insures practical results under adverse conditions and without the need of expert assistance or supervision. This consists essentially in the burning of a tablet of special composition that will produce gas of a desired density and strength for the necessary period to insure complete action, together with a simple stove in which the tablets are burned. This is known as the Junior Insector. As shown in the drawing, this consists of a pail 7¾ in. high by 8¾ in. in diameter at the top, provided with a cover having the shape of an inverted pan. Both pail and cover are perforated with openings calculated to admit the right amount of air to insure the desired rate of combustion. The receptacle is equipped with two trays, a lower one to hold a small piece of cotton saturated with alcohol, which is used to start the burning and the upper tray to support the tablets. A further item of the quipment is a small metal stand to support the receptacle over a tray of water. This is primarily a fire prevention measure.

In making use of this equipment care is first taken to seal all openings in the room or car. The outfit is then set on the floor, the cotton is ignited and the room is closed tight for about six hours. A short period of thorough airing after the room has been opened allows the gas to escape. With three pounds of tablets this machine has a capacity of 1,500 cu. ft. of room air space; thus two outfits are required to fumigate a bunk car. In a recent test five pounds of tablets, costing 15 cents per pound, proved thoroughly effective in a period of five hours with the wind blowing 30 to 35 m. p. h.

These insectors have been used very successfully in fumigating railway bunk cars. Placed in charge of the roadmaster or the maintenance officer, who has one man thoroughly instructed in the use of the machine, it does not take long to acquaint the various foremen with the method of operation, so that they can request a machine and use it without assistance whenever they find it necessary. This equipment is now being used on a number of roads, including the Pittsburgh & Lake Erie, the Michigan Central, and the Cleveland, Cincinnati, Chicago & St. Louis.

OPERATING MIXERS BY KEROSENE

ONE OF THE NEWEST developments in concrete mixers is the use of kerosene as a fuel, following the practice with railway motor cars, pumping engines, etc. This has been made practicable by the introduction



THE TWIN SERVICE CARBURETOR

of a duplex carburetor with which either gasoline or kerosene may be used at will. As shown in the illustration, the carburetor is fitted with connections for gasoline, kerosene and water, the supplies all being received by gravity from an elevated fuel tank, thus dispensing with pumps. Another feature of special interest is a

superheater for volatilizing the kerosene, the heat being supplied by exhaust engine gas. The pipe marked D is a connection to supply this hot gas from the muffler. This carburetor is known as the Twin Service Carburetor, and is manufactured by the Northwestern Steel & Iron Works, Eau Claire, Wis., manufacturers of the Northwestern engine.

THE MATERIAL MARKET

EACH PASSING MONTH evidences a greater degree of centralized control of material distribution and the month just passed has witnessed some of the most drastic action of this nature, which has yet occurred. The steel industry has submitted to a most complete control of its output, fixed prices have been established for cement and the lumber industry is being studied with a view to establishing lumber prices for the general public, in addition to those already applying for government purchases.

The great change in the steel market is in the form of an agreement between the War Industries Board and the steel manufacturers, of which the following is the vital clause:

"That no pig iron or steel manufactured products shall be shipped or delivered, except as follows:

(1) By priority certificates issued by the priorities division of the war industries board; or

(2) After priority certificates shall have been issued or filled, then producers of pig iron and of steel manufactured products may utilize such raw materials and manufacturing capacity, if any, as they may have available, to fill orders of their customers not covered by priority certificates, provided such orders are embraced within the schedule of purposes entitled to preference treatment as determined by the priorities board."

This is a matter of no alarm to the railroads, since arrangements will be made for any supplies or equipment demonstrated as necessary by the Railroad Administration in the face of other imperative calls for the available supply of iron and steel. Apparently steel rails have not been considered as coming under this classification since the long expected order for rails has not been announced. In the meantime quite a few of the railroads have placed orders for track fastenings, as recorded in the news section of this issue. Some 4,000 tons of structural bridge contracts from several eastern roads recently awarded or now pending indicate that necessary work of this kind is being provided for.

Prices for iron and steel items of interest to the maintenance of way field are given below:

Standard Bessemer rails (nominal)	$55.00 per gross ton
Standard Open-Hearth rail (nominal)	57.00 per gross ton
Relaying rail	$60 to $65 per gross ton
Track spikes, Pittsburgh, $3.90; Chicago	$4.11½ per 100 lb.
Track bolts, Pittsburgh, $4.90; Chicago	$5.11½ per 100 lb
Angle bars, Pittsburgh, $3.25; Chicago	$3.25 per 100 lb.
Tie plates, Chicago	3.25 per 100 lb.
Wire nails, Pittsburgh	3.50 per 100 lb.
Structural steel plates, Pittsburgh	3.25 per 100 lb.
Structural steel shapes	3.00 per 100 lb.
Structural steel bars	2.90 per 100 lb.

As explained in detail in the report of the activities of the Railroad Administration on another page of this issue, the price of cement purchased by the railroads or used by contractors on railroad work was fixed by the Portland Cement Committee of the War Industries Board. Typical prices are tabulated below:

Universal, Pa.	$1.75	Portland, Colo.	$1.75
Hannibal, Mo.	1.70	Salt Lake City, Utah	1.90
Mason City, Ia.	1.70	Cement, Cal.	1.95

Shipments in bulk 15 cents per barrel less.
Shipments in paper bags 10 cents per barrel additional.
Shipments in cloth bags 40 cents per barrel additional.

The prices for lumber established for purchases by the government were tabulated in part in these columns some months ago. A number of modifications in these prices are now in progress, while prices to the public are being studied. The following are given from current prices for southern pine f. o. b. the mills for the general trade. The government established prices are, of course, somewhat lower:

Dimension.

2x 4, 10 ft.	$25.57
2x 4, 20 ft.	26.09
2x 6, 10 ft.	23.45
2x 6, 20 ft.	24.27
2x10, 10 ft.	24.61
2x10, 20 ft.	24.56

Timbers.

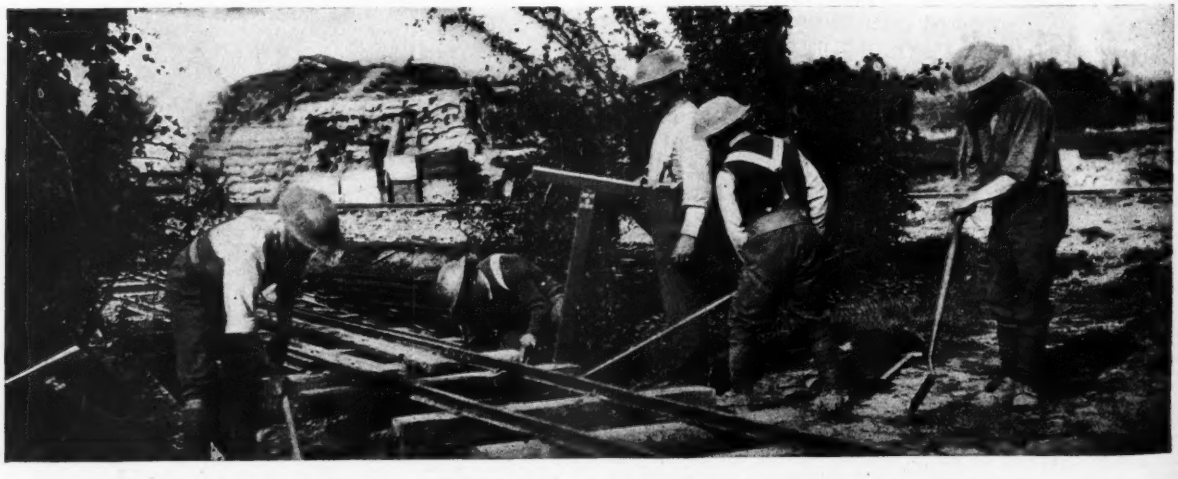
4x4 to 8x8, No. 1, up to 20 ft.	$25.98
3 and 4x10, No. 1, up to 20 ft.	28.23
6x12 to 12x12, No. 1, up to 20 ft.	31.50

Stringers.

16 in. heart (85 per cent) 30 ft.	$38.50

Caps.

12x14 heart (85 per cent) 14 ft.	$38.00
Bridge ties, heart	34.82



ENGLISH TROOPS LAYING A NARROW GAGE WAR RAILROAD NEAR THE FRONT IN FRANCE

GENERAL NEWS DEPARTMENT

The committee organized by the railway supply companies of Chicago to raise contributions to the Red Cross Fund succeeded in raising $188,864, as against a quota of $175,000.

A delegation of Colorado citizens, headed by Senator Shafroth, called at the Railroad Administration recently to urge a loan of six million dollars to the Denver & Salt Lake to build a proposed tunnel under James Peak.

The Alaskan Railway is to receive an appropriation of $5,350,000 for the next fiscal year if the recommendations of the appropriations committee of the House of Representatives are adopted. This will keep the present force of 5,000 men at work.

Alba B. Johnson, president of the Baldwin Locomotive Works, was elected president of the Railway Business Association by the general executive committee on May 23, following the resignation of George A. Post, who had served as president since the association was formed.

An appropriation of $3,500,000 for the continuation of the railroad valuation work for the fiscal year ending June 30, 1918, is included in the sundry civil appropriation bill, reported to the House on June 10. Other appropriations for the Interstate Commerce Commission amount to $2,045,000.

The Hudson Bay Railway has had no construction work done during the past year, though a bridge was completed at the second crossing of the Nelson river. Up to date a length of 332 miles of the line have been finished and track is yet to be laid on 92 miles. Trains are being operated on 214 miles, on a part of which there is a daily train service.

The Chicago, Burlington & Quincy has organized 50 students of the University of Chicago into a special gang which started for Sheridan, Wyo., on June 17 to spend the summer on track work in that vicinity. This road has also secured nearly 300 high school boys for its track gangs as a result of a campaign which local officers have made in the high schools.

The Western Regional Purchasing Committee has advised the roads in that area of a considerable amount of new and second hand material available for use by other roads. This material includes 24,400 new and second hand rail braces, a second hand air compressor, a locomotive type boiler, 61 miles of 60-lb., 70-lb. and 80-lb. A. S. C. E. rail complete with turnouts and fastenings, 2 50-ton locomotives, several cars and a large number of through, deck, truss and girder bridge spans.

Secrecy as to troop movement is called for by the Committee on Public Information, in a circular addressed to editors and correspondents. Following the publication recently of a notice of a troop train movement due to occur in eastern Illinois, the track was tampered with. Enemy sympathizers evidently learned of the troop train movement because of the premature newspaper publication of the fact, and removed rails from the track of the Wabash road. A trackwalker luckily discovered the break in time to repair the damage before the troop train passed.

A Meeting of the executive and other committees of the Roadmasters' and Maintenance of Way Association was held in Buffalo on Saturday, June 1, to consider the plans for the thirty-sixth annual convention. About 40 roadmasters were in attendance. It was decided to proceed with the plans for a meeting at the Auditorium Hotel, Chicago, on September 17-19 and a program was outlined with particular reference to the problems now confronting the men in the track department. It was decided to eliminate all entertainment features and to substitute a "war" dinner for the annual banquet on Wednesday evening. The Track Supply Association will present an exhibit as in past years.

The United States Employment Service has established a division of engineering with A. H. Krom, secretary of the American Association of Engineers, Chicago, as director. Opportunity will be given technical men to register for emergency government work or for permanent advancement in positions meeting their qualifications. Offices will be maintained at 29 South La Salle street, Chicago.

On July 1 the four principal express companies operating in the United States—the Adams Express Company, the American Express Company, the Wells Fargo Express Company and the Southern Express Company—are to be combined into a new company known as the American Railroad Express Company. This is a privately-managed corporation acting as the director general's agent for carrying on the express business, of which it will have a virtual monopoly. The Government will be given any profits above 5 per cent earned on the capital stock of the company and will receive 50¼ per cent of the gross earnings as compensation for moving the express traffic. The officers of this new corporation are men selected from among the officers of the four companies which were combined.

Washouts of railway tracks occurred in Iowa the first week in June, causing a suspension of train movement on a number of lines. The Chicago-Omaha line of the Rock Island was washed out at points near Grinnell, Malcolm, Brooklyn, Carnforth and Victor, while the line between Des Moines and St. Paul was also washed out between Cambridge and Buckeye. The Chicago & North Western had some of its tracks flooded at Eldora, Gifford and Gladbrook and also between Dunlap and Dow City and at Boone. The Chicago, Milwaukee & St. Paul had washouts between Amana and North English on its Cedar Rapids line, while the Chicago Great Western was flooded between Carroll and Harlan and between Ira and Baxter.

The War Department announces that the organization of five new regiments and nineteen battalions of railway engineers is being completed by S. M. Felton, Director General of Military Railways. The work has been done in conjunction with the Engineer Corps. When the new forces are put on duty there will be 50,000 Americans engaged in railroad construction and operation in France. A total of $160,000,000 has been spent on railway materials alone, this sum not including supplies provided and used by the Engineer Corps proper. All the nine regiments now in service have been in France since August, 1917. Six of them have been engaged in construction work, building and rebuilding railways, building docks, rearranging terminal facilities in the line of efficiency and generally providing for the heavy shipments of Americans and American supplies. The other three regiments have been engaged in operation. Some of the railway troops have been engaged in the actual fighting line.

COMPETITION FOR LABOR

The Department of Labor has been requested by the Railroad Administration to assist the latter in preventing the disorganization of the labor market by competing government contractors. Most of the railroads are now hiring their labor through the regular government service. Private contractors holding government contracts have, however, refused to cooperate with the government in the matter of securing labor, and as a consequence are disorganizing the labor market.

Many of the firms mentioned in the protests received from the Railroad Administration are said to have been carrying extensive advertisements in a great many southern papers, to the detriment of both railroads and farms. The Director General was advised by Assistant Secretary Louis F. Post that, although the department does not at present possess the necessary authority, it hopes to be able to put an end to this practice in the near future.

Mo., succeeding Mr. Tabbert. **J. L. Plain,** assistant roadmaster, has been promoted to general foreman in charge of terminals at Galesburg, Ill. **C. Dagen,** extra gang foreman, has been promoted to assistant roadmaster on the Beardstown division, with headquarters at Beardstown, Ill. **C. E. Anderson** has been appointed roadmaster on the Burlington division, with headquarters at Burlington, Ia., succeeding **C. E. Double,** transferred to Sheridan, Wyo.

BRIDGE

S. H. Gilligan, assistant supervisor of bridges and buildings on the Boston & Albany, has been promoted to supervisor of bridges and buildings, with headquarters at Worcester, Mass., succeeding **E. K. Mentzer,** promoted. **J. W. Hyson** has been promoted assistant supervisor of bridges and buildings, succeeding Mr. Gilligan.

O. Magnuson has been appointed general foreman of bridges and buildings of the Northern division of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at Spooner, Wis., succeeding **E. Gunderson,** who has been transferred to the Eastern division. Mr. Magnuson entered the service of the Chicago, St. Paul, Minneapolis & Omaha in October, 1914, as a water supply foreman and served in that capacity until his appointment as general foreman in the following year. Previous to this time Mr. Magnuson was employed as a water supply repairman on the Minnesota & International, and he also spent three years with the Duluth & Iron Range in shop and bridge work.

August G. Rask, general bridge foreman of the Eastern division of the Chicago, St. Paul, Minneapolis & Omaha, has been appointed superintendent of bridges and buildings of the entire system, with headquarters at St. Paul, Minn., succeeding **J. D. Moen,** who has entered military service. Mr. Rask entered the service of the Chicago, St. Paul, Minneapolis & Omaha on January 28, 1888, as a laborer in a mason crew, and the next spring he was transferred to a bridge gang, where he worked as a bridge carpenter until 1898, when he was promoted to bridge foreman. He held this position until April 1, 1909, when he was appointed general foreman on the Nebraska division. In the same year he was transferred to the Northern division, where he remained until January 1, 1914, when he was transferred to the Eastern division in the same capacity of general foreman, which position he held when appointed superintendent of bridges and buildings, as noted above.

IN GOVERNMENT SERVICE

A. C. Everham, formerly terminal engineer of the Union Pacific at Kansas City, Mo., has been assigned to the work of supervising constructing quartermaster, with the rank as major, in the quartermaster's corps of the National Army. He is now located at Washington, D. C.

OBITUARY

Edward H. Spalding, division engineer of the Duluth, Missabe & Northern, died at his home in Duluth, Minn., on May 28, 1918, at the age of 67 years. He was born in Trenton, N. J., and was educated at the Engineering Academy of that town. He entered railroad construction work with one of the small lines which is now a part of the Erie system. When quite a young man he went to Peru and spent two years in railroad construction in the Andes. Upon returning to the United States he entered contracting business with his father, who was a civil engineer, and shortly after went to Russia, where he spent five years in general contracting work. After leaving Russia he went to Mexico, spending seven years on the Mexican National Railways in charge of construction and operation. He then returned to the United States and about 1890 went to Duluth to report on the possible development of the water power of the St. Louis river. From 1898 to 1900 he served with the engineers of the United States government in the Lake Superior district, and in the latter year he entered the service of the Duluth, Missabe & Northern, remaining in continuous service with that company until his death.

CONSTRUCTION NEWS

The Alaskan Railroad is surveying a line between Moose Creek and Baxter, a distance of about five miles.

The Atchison, Topeka & Santa Fe, which was authorized by the Railroad Administration to resume construction of the Osage County & Santa Fe from Caney, Okla., to Pawhuska, as announced in the *Railway Maintenance Engineer* for June, has also been granted permission to extend this line from Pawhuska to Fairfax Junction, 27 miles further.

The Santa Fe has also been authorized to make a 30-mile extension of the North Texas & Santa Fe, which has been completed for 28 miles west of Shattuc, Okla.

The Canadian Northern has authorized the extension of its Elrose branch in Saskatchewan easterly, a distance of about 25 miles, to Alsack, and grading is now under way. A contract has also been let for the grading on an extension from Gravelburg, Sask., northwest 14 miles towards Swift Current. Another extension will be built from Hanna, Alta, southeast a distance of 47 miles towards Medicine Hat, the contracts for the grading of this line having been let.

The Canadian Government Railways plans to carry out work on the western lines during the next year as follows: District No. 2, double 16-ft. reinforced concrete culvert and fill to replace pile trestle at O'Brien, Superior district, mile 30.2, to cost about $45,000; district No. 3, main line, 8-ft. by 10-ft., stream tunnel and fill to replace timber trestle at Winnipeg, Superior district, mile 47.1, to cost about $60,000; district No. 3, 50-ft. deck plate girder and fill to replace timber bents, Grand Trunk Pacific branch, Fort William, Superior district, mile 27.7, to cost about $22,500, and 10-ft. by 10-ft. stream tunnel and fill to replace timber bents at Fort William, Superior district, mile 41.3, to cost about $59,000; double 16-ft. reinforced concrete culvert and fill to replace timber bents at Raith, Superior district, mile 118.1, to cost about $52,500, and 10-ft. by 10-ft. stream tunnel and fill to replace timber bents at Raith, Superior district, mile 124.4, to cost about $30,000.

The Choctaw, Newcastle & Western is being built from the Chicago, Rock Island & Pacific, at Alderson, Okla., to Coal Fields, 6½ miles. C. M. Conway of Texarkana, Ark., has the contract for the work, which was begun in March. About 75 per cent of the line has been completed.

The Elgin, Joliet & Eastern is asking for bids on a brick building containing lockers, toilet rooms, dormitories, etc., for enginemen and firemen, at Gary, Ind. It has also asked for bids on water softeners to be located at Frankfort, Ill., and Spaulding, and reinforced concrete coaling stations at South Chicago, Ill., and Gary, Ind.

The Great Northern is putting in approximately 60 additional passing tracks at various points on its main line this season.

The Illinois Central has awarded a contract to M. L. Windham, Centralia, Ill., for 30,000 cu. yd. of grading work for additional yard tracks at Centralia, Ill., which will cost about $171,000. The track work will be done by company forces.

This company has awarded contracts for the construction of mechanical facilities at Fulton, Ky., Amboy, Ill., Champaign, Carbondale and Mounds. The work at Fulton will include the removal of the old roundhouse and other buildings on the site; the construction of a 12-stall roundhouse, a machine shop and boiler room, a concrete stack, a standard office, store and oil house, a toilet building, 2 Robertson cinder conveyor pits, complete sanding equipment, and sewers and water works. A contract covering this work has been awarded to Joseph E. Nelson & Sons, Chicago. The work at Amboy involves the clearing of the site, the construction of a 12-stall roundhouse, a 100-ft. turntable, a machine shop

and boiler room, a concrete stack, a standard office, store and oil house, a toilet building, complete sanding equipment and sewers and water works. This has been awarded to W. J. Zitterell & Co., Webster City, Iowa.

The work at Mounds will involve the construction of practically the same facilities as at Fulton and Amboy; the roundhouse, however, having 24 stalls and the turntable a length of 85 ft. Geo. B. Swift & Co., Chicago, has the contract. The work at Champaign has been let to the Leyden-Ortseifen Company, Chicago, and that at Carbondale to T. S. Leake & Co., Chicago.

This road is also asking bids on a 600-ton frame coal chute at Fulton and a 500-ton coal chute at Gwin, Miss.

The Illinois Central's program for 1918 includes considerable track construction. Six additional yard tracks will be built at the Wildwood yard, Chicago, at a cost of about $75,000. Second main track will be extended between Belleville, Ill., and Wilderman at a cost of about $55,000; 21 tracks will be extended in Nonconnah yard at Memphis, Tenn., at a cost of about $209,000, and a new northbound departure yard consisting of six tracks will be built at that point at a cost of $120,000. At Champaign, Ill., a new six-track northbound yard will be constructed costing $118,000, and at East St. Louis a new yard containing five additional 60-car tracks will be built and the old yard will be enlarged to include five additional 50-car tracks at a cost of $96,000.

Water purifying plants will be installed at four points in Iowa on the Albert Lea district of the Minnesota division at a cost of $33,000, and five plants will be installed on the Cherokee district of the Iowa division at a cost of $45,000. Additional water facilities at Gilman, Ill., will cost $26,500 and new water facilities at Pesotum, Ill., will cost $33,000.

At La Salle, Ill., a new freight house with the necessary track changes and the conversion of the present freight house into an engine house will cost approximately $50,000.

This company has awarded a contract to the Walsh Construction Company, Davenport, Iowa, for grading work in its new Markham yard near Chicago, the completion of which will involve the movement of six or seven million cubic yards of material. That to be undertaken this year aggregates about 1,500,000 cu. yd. The contract was awarded on a cost plus fixed sum basis. The track work will be done by company forces.

The Kanawha & Michigan has awarded a contract to the Austin Company, Cleveland, for the construction of an inbound freight house, 40 ft. by 550 ft., with a canopy platform, 12 ft. by 600 ft., a two-story office building and basement, 144 ft. by 42 ft., and an outbound freight house, 32 ft. by 300 ft., at Charleston, W. Va. The structures will replace buildings destroyed by fire on May 17. The inbound freight house is to be completed within 50 days of the time work on the building commenced.

The Railroad Administration and Chicago City Council have reached an agreement with regard to track elevation work, which has been held up since railroads were taken over by government. Under the plan agreed upon work amounting to $395,000 will proceed, while expenditures aggregating $5,500,000 are deferred. The Illinois Central work on the Kensington and Eastern branch will be avoided by discontinuing operation over a portion of the line. Work will also be abandoned temporarily on the Chicago & Western Indiana and the Rock Island crossings of Cottage Grove avenue, where contemplated work will involve an expenditure of $4,500,000. Track elevation on the Baltimore & Ohio Chicago terminal from Sixty-fourth to Sixty-ninth streets will be completed at a cost of $200,000. The elevation of tracks on the Englewood Connecting Railroad (Pennsylvania Lines), estimated to cost about $1,000,000, will be deferred. The completion of the separation of grades at Vincennes road and Eighty-seventh street with the Chicago, Rock Island & Pacific, has been authorized at a cost of $185,000, because the work has been under way for some time and its present stage leaves the streets in bad condition. No agreement was reached on the work contemplated for the Illinois Central's South Chicago branch, involving 40 crossings in a distance of two miles, but the work will probably be deferred.

SUPPLY TRADE NEWS

GENERAL

The Blaw-Knox Company's office at San Francisco has been removed from the Rialto Bldg. to their new office and warehouse at 528-530 Second street. O. B. Pulis is in charge.

The Q & C Company of New York and Chicago announces the appointment of the General Supply Company, Ltd., of Canada (358-360 Sparks street, Ottawa, Canada, with branch offices at Montreal, Winnipeg and Vancouver), as sole representatives in Canada.

The Parkersburg Iron Company announces the following changes among its resident sales managers, effective June 1, 1918: **R. J. Sheridan,** New York office; **G. W. Denyven,** Boston office; effective July 1; **J. A. Kinkead,** San Francisco office. The other selling representatives remain as at present.

CHICAGO PNEUMATIC TOOL COMPANY

The following changes in the organization of the manufacturing and sales departments of the Chicago Pneumatic Tool Company has been effected by H. A. Jackson, the company's new president: **W. H. Callan,** manager of the company's two compressor plants at Franklin, Pa., has been appointed general manager of plants, with headquarters in Chicago. **W. P. Pressinger,** manager of the compressor and engine departments at Chicago, has been appointed general manager of sales, with the same headquarters. **H. D. Megary,** previously with the Bethlehem Steel Company, South Bethlehem, Pa., has been made assistant to the president at Chicago. **G. A. Rees,** general purchasing agent, has been promoted to manager of purchases and stores at Chicago. These officers will report directly to the president.

W. P. PRESSINGER

In addition, the following changes have been made in the sales department. These officers, most of whom formerly reported directly to the president, will hereafter report to the general manager of sales and will constitute his staff: **J. G. Osgood,** manager of the pneumatic tool sales division; **C. B. Coates,** manager of electric tool sales division; **H. L. Dean,** manager of compressor sales division, formerly assistant manager of the compressor department at New York; **B. R. Hawley,** manager of engine sales division, formerly assistant manager of the engine department at Chicago; **T. J. Hudson,** manager of the motor truck sales division. All of these men will have headquarters in Chicago. The above appointments were effective May 27.

W. P. Pressinger, who has been promoted to general manager of sales, was born in New York City on September 27, 1871. In 1887 he entered the employ of the Clayton Air Compressor Works, New York. He remained with that company for 13 years, rising to the position of manager of sales. In 1900 Mr. Pressinger organized the New York Air Compressor Company, of which corporation he was secretary and general manager. In the following year the company was assimilated by the Chicago Pneumatic Tool Company. Mr. Pressinger has been manager of the compressor department of that company up to the time of his appoint-

ment as general manager of sales, as aforementioned. He is also president of the Compressed Air Society.

C. E. Smith & Co., consulting engineers, St. Louis, Mo., announce that in the absence of C. E. Smith, who has received a commission in the national army, their business will be conducted under the direction of W. S. Dawley, formerly chief engineer of the Chicago & Eastern Illinois, who has been engaged for several years in consulting engineering work.

At the first annual meeting of the directors of the United States Switch Company, located at Eau Claire, Wis., F. E. Nicoles, division superintendent of the Chicago, St. Paul, Minneapolis & Omaha, at Eau Claire, was elected vice-president. Charles McArthur, secretary and treasurer, and Lee T. Pond, assistant secretary and treasurer. James W. Hubbard was re-elected president and general manager.

PERSONAL

Henry Fischer, general sales manager of the Verona Tool Works, with headquarters at Pittsburgh, Pa., has resigned from that company to go with the Procter & Gamble Soap Company at Cincinnati, Ohio.

Frank Lucas DeArmond, who for many years was an officer of the Protectus Paint Company, Philadelphia, Pa., has severed his connection with that company for the duration of the war, to become a captain in the quartermaster's corps, construction division.

G. H. Corse, Jr., has resigned as traffic manager of G. Amsinck Company, New York, to become traffic manager of the Robertson-Cole Company of New York, general exporters of motor cars, steel, etc., with headquarters at San Francisco. Until a few months ago, Mr. Corse was foreign passenger agent of the Union Pacific System.

David T. Hallberg, who has been promoted to district sales agent of the P. & M. Company, with headquarters at Chicago, was born at Ottumwa, Iowa, on September 11, 1885. After completing his education in the public schools in that city, he went to Chicago in 1901, and was there employed in the printing industry until he entered the service of the Atchison, Topeka & Santa Fe, passenger and advertising department, in 1905. Later he was appointed western representative of the Santa Fe employees' magazine. He remained in that position until he entered the service of the P. & M. Company as material inspector in May, 1910. Shortly after that he became western representative and in January, 1918, he came to Chicago as sales representative, which position he held until his present promotion.

DAVID T. HALLBERG

George M. Coale, who was elected vice-president of the Duncan Lumber Company on June 14, was born at Gospourt, Ala., on May 30, 1885. In 1903 he entered the employ of the Keith Lumber Company as a clerk at Voth, Tex., remaining with that concern until 1905, when he was appointed assistant sales manager of the Continental Lumber Company at Houston, Tex. The latter part of the following year he was elected secretary and sales manager of the same company. In 1909 he became northern sales manager for the Kirby Lumber Company of Houston, Tex., with headquarters at Chicago, with which company he remained until 1911, when he returned to the Continental Lumber Company as vice-president. He retained this position until his recent election as vice-president in charge of railway sales of the Duncan Lumber Company of Portland, Ore.

TRADE PUBLICATIONS

Little David Pneumatic Tools.—The Ingersoll-Rand Co., New York, has recently issued a four-page pamphlet showing the complete line of "Little David" pneumatic tools. Tables of sizes and capacities are given and illustrations show all the tools and their applications.

"Keystone Quality."—The Keystone Manufacturing Company, Buffalo, N. Y., has issued a 40-page pamphlet illustrating and describing the rachets manufactured by that company for use in drills and wrenches, and also the Westcott S-wrench. The catalog gives complete information concerning the various styles of these tools designed for a great many different purposes.

Insley Products.—The Insley Mfg. Company, Indianapolis, Ind., has issued a 100-page booklet illustrating and describing the line of concrete handling equipment manufactured by that company. The first portion of this catalog is devoted to an exposition of the method of handling concrete by spouting, including considerable cost data. This is followed by illustrations of installations of this form of equipment on various construction projects, while the larger part of the book is devoted to descriptions, illustrations and lists of the various types of equipment, including elevating bucket, towers and hoists, concrete spouts, hopper cars and carts, etc.

TRACK SUPPLIES

The Baltimore & Ohio has placed an order for 1,000 kegs of spikes.

Pennsylvania Lines West recently ordered 3,000 kegs of spikes of two Pittsburgh concerns, one to deliver 1,200 kegs, the other 1,800 kegs.

The New York, Chicago & St. Louis has inquired for 1,700 kegs of spikes.

The Norfolk & Western has inquired for 8,000 kegs of spikes.

MEXICAN WORKMEN MAY COME INTO UNITED STATES

Secretary of Labor Wilson has issued a departmental order temporarily removing restrictions on the importation of Mexican labor to be used in certain specified occupations effective June 20. The order provides that during the present emergency conditions Mexicans entering the United States to engage in agricultural pursuits, in railroad section maintenance, and in lignite coal mining will be exempt from the head tax, literacy test, and contract-labor provisions imposed by previous rulings.

The Federal Employment Service will be in charge of the distribution of Mexican labor and orders have been issued for opening branch offices of the service at all Mexican ports of entry. Special examiners familiar with the Mexican language and labor conditions in that country are being assigned to these stations and will assist local immigration inspectors in examining applicants. It is believed that the increase to the unskilled labor supply from Mexico and Porto Rico, coupled with the decision to place the recruiting and distributing of all unskilled labor entirely in the hands of the United States Employment Service after August 1, will relieve the present shortage of unskilled labor to a large extent.

Employers may initiate applications for permission to import Mexican labor under the new provisions by filing such application with either a United States Immigration or a United States Employment Service official, setting forth the number of laborers desired, class of work, wages offered, and place of proposed employment, and promising to comply with all provisions with respect to all aliens admitted to their jurisdiction. Emphasis is placed upon the fact that provision is made only for the temporary admission of an alien who in all other respects would be admissible under the laws of the United States if he were entering for permanent purposes.